

GOVERNMENT OF INDIA :: DEPARTMENT OF SPACE
SATISH DHAWAN SPACE CENTER SHAR :: SRIHARIKOTA – 524 124
SRI POTTI SREERAMULU.NELLORE DISTRICT (A.P)

PUBLIC TENDER [COWAA] Notice No. SHAR/Sr.HPS/PT/08/2019-20

Sl. No	File Ref No.	Item Description	Due Date for Bid Submission	Tender Fee
01	SHSH 2019 00 0102 COWAA [Two Part basis]	Design, Fabrication, supply, erection and Commissioning of Visitor Complex – Entrance Plaza.	02.07.2019 @1600 hrs.	Rs.500 + GST

Instructions to Tenderers:

01. For full details/scope of work and terms and conditions etc., please see the enclosed annexures.
02. Tender documents are also available on ISRO website www.isro.gov.in; SDSC SHAR, Sriharikota website www.shar.gov.in; same can be down loaded and offer submitted.
03. Quotations received after the due date/time will not be considered.
04. Tender documents can be downloaded by tenderers from the ISRO website. In case a tenderer is using the documents and forms downloaded from the website, the cost of tender document shall be sent by the tenderer to the Centre/Unit in the form of Bank Draft attached to a forwarding letter in a separate envelope along with the other envelopes containing the quotations.
05. One set of tender documents can be supplied free of cost to Government Departments, Public Sector Undertakings (both Central & State) and Small Scale Industries Units included in the list of National Small Industries Corporation. Vendors registered as MSEs and Registered with KVIC are also eligible for free tender documents. In case the requirement is for imported stores, including Fabrication/Developmental Orders of critical items, in addition to the advertisement in national dailies and a complimentary copy of the tender document shall be sent direct to the foreign manufacturer/supplier and the Embassies of the foreign countries concerned in India.
06. Sr. Head, Purchase and Stores, SDSC-SHAR, Sriharikota reserves the right to accept or reject any/or all the quotations.

DT.17.06.2019

SR.HEAD, PURCHASE & STORES



**Request for Proposal (RFP) for
Planning, Design, Fabrication, Supply, Erection and
Commissioning of Pre-Engineered steel building including Civil,
Electrical & AC works for **ENTRANCE PLAZA** at Visitors Complex
at Sriharikota.**



**SATISH DHAWAN SPACE CENTRE SHAR
SRIHARIKOTA-524124, AP**

Tender Document Purchase Value:

- (a) **Tender document may be bought from Purchase & Stores Division, SDSC SHAR, Sriharikota** by submission of Demand Draft of Rs.525/- issued in favour of Sr. Accounts Officer, SDSC SHAR payable at State Bank of India, Sriharikota branch.
- (b) **In case tender document is not bought from SDSC SHAR, Purchase & Stores division**, please enclose Demand Draft of Rs.525/- issued in favour of Sr. Accounts Officer, SDSC SHAR payable at State Bank of India, Sriharikota branch towards the Tender Document Purchase Value. *Any tender not accompanied with DD shall be treated as invalid tender and rejected*
- (c) MSME registered vendors with NSIC or vendors who have already applied for renewal of registration, Central PSUs/PSEs/Autonomous Bodies, KVIC, National Small Industries Corporation shall be exempt from the payment of Tender Document Purchase Value. *Vendors seeking exemption from payment of Tender Document Purchase Value shall submit necessary documentary proof, if documentary proof is not suffice the requirement and DD is not submitted then it shall be treated as invalid tender and rejected.*

PLANNING, DESIGN, FABRICATION, SUPPLY, ERECTION AND COMMISSIONING OF PRE-ENGINEERED STEEL BUILDING INCLUDING CIVIL, ELECTRICAL & AC WORKS FOR ENTRANCE PLAZA AT VISITORS COMPLEX AT SRIHARIKOTA AT SDSC SHAR

- Proposals are invited from the interested bidders for the enclosed scope of work in **two part bid**. Part-1 technical and unpriced part of the work and Part-2 Priced commercial part.
- The scope of the work includes the Planning, Design, Fabrication, Supply, Erection and Commissioning of Pre-Engineered Steel Building Including Civil, Electrical & AC Works for Entrance Plaza at Visitors Complex, Sriharikota. The supply and installation of the system should meet all relevant National and International standards. SDSC SHAR, Sriharikota is located about 100km north of Chennai and 85km south of Nellore.
- The address and contact numbers for seeking clarifications regarding this RFP are given below

(a)	Bids/queries to be addressed to	Sr.Purchase& Stores Officer, SCF
(b)	Postal address for sending the Bids	Tender Section Satish Dhawan Space Centre SHAR, ISRO, Dept. of Space, Govt. of India, Sriharikota – 524124, SPSR Nellore Dist, Andhra Pradesh
(c)	Name/designation of the contact personnel	Mr.SenthilSelvan
(d)	Telephone numbers of the contact personnel	08623-22 5174/5023
(e)	e-mail ids of contact personnel	sselvan@shar.gov.in
(f)	Fax number	08623-22 5170

- This RFP is divided into three Parts as follows:
 - Part I** – Contains General Information and Instructions for the Bidders about the RFP and commercial terms & conditions.
 - Part II** – Contains essential details of the items/services required, such as the Schedule of Requirements (SOR), Technical Specifications, services required, etc.
 - Part III** –Contains qualification criteria, Evaluation Criteria and Annexures.
- This RFP is being issued with no financial commitment and the Buyer reserves the right to change or vary any part thereof at any stage. Buyer also reserves the right to withdraw the RFP, should it become necessary at any stage.
- DOCUMENTS COMPRISING THE BID**
Bids duly filled in by the Bidder should invariably be submitted as stipulated in the Letter inviting bid. Bids shall be submitted in the following manner.

6.1. PART – I : UN PRICED TECHNO-COMMERCIAL PART OF THE BID FOR THE WORK

Technical and unpriced commercial bid Part-I shall comprise the attachments, specifying attachment number arranged in the order as follows:

- (a) Submission of bid letter along with one set of proposal document (RFP) duly signed and stamped as token of acceptance.
- (b) Copy of Company's registration number certificate.
- (c) Power of attorney in favour of authorised signatory of the bid / proposal documents.
- (d) All the annexures enclosed in proposal duly filled, signed and sealed
- (e) **Unpriced copy of schedule of prices with all other commercial terms and conditions duly filled (Prices to be kept blank), signed and stamped**
- (f) Data sheets for all the equipment & checklists enclosed in proposal duly filled, signed, & stamped.
- (g) Technical details, equipment general arrangement drawings with part list, catalogue, layout drawings, P & I diagram, catalogues etc as applicable and any other drawing, document as mentioned in the proposal.
- (h) Audited balance sheet including profit and loss account for last three financial years showing annual turn over
- (i) Latest income tax certificate.
- (j) Latest solvency certificate.
- (k) List of projects in hand & completed during last 3 financial year indicating the name of client, contact person, contract value, nature of work, work completed, work balance, name of Consultant, month & year of commencement & completion etc.
- (l) Any other relevant document, bidder desires to submit.
- (m) The details of bought out items and procurement plan is to be provided.
- (n) **Any bids/offers with price details in Techno-Commercial Offer (Part –I) shall be rejected.**

6.2. PART – II : PRICE PART OF THE BID FOR THE WORK

Priced commercial bid shall contain schedule of prices duly filled in, signed and stamped. No deviations, terms and conditions, assumptions, conditions, discounts etc. shall be stipulated in price bid. Department will not take cognisance of any such statement and may at their discretion reject such bids.

7. BID SUBMISSION

Bids duly filled in by the Bidder should invariably be submitted as stipulated in the Letter inviting bid. Both the Parts (i.e. Part I & Part II) prepared as described above shall be inserted in another envelope and marked with the following:

Title of the proposal	:	"Planning, Design, Fabrication, Supply, Erection and Commissioning of Pre-Engineered Steel Building Including Civil, Electrical & AC Works for Entrance Plaza at Visitors Complex, Sriharikota."
Due date and time of the opening	:	
From (Name of the bidder with address)	:	
To:		Head, Purchase & Stores Satish Dhawan Space Centre SHAR ISRO, Dept. of Space, Govt. of India Sriharikota – 524 124, SPSR Nellore Dist, Andhra Pradesh, India

7.1. Part – I Techno-Commercial Part of the Bid for The Work

ENVELOPE SHALL BE MARKED WITH FOLLOWING:

<u>PART-I: TECHNO-COMMERCIAL BID</u>		
Name of client	:	Satish Dhawan Space Centre SHAR Indian Space Research Organisation
Title of the proposal	:	"Planning, Design, Fabrication, Supply, Erection and Commissioning of Pre-Engineered Steel Building Including Civil, Electrical & AC Works for Entrance Plaza at Visitors Complex, Sriharikota."
Due date and time of the opening	:	
From (Name of the bidder with address)	:	
To:		Head, Purchase & Stores Satish Dhawan Space Centre SHAR ISRO, Dept. of Space, Govt. of India Sriharikota – 524 124, SPSR Nellore Dist, Andhra Pradesh, India

This envelope shall comprise the original signed copy of the proposal document, drawings, addendum/corrigendum (if any), unpriced copies of schedule of prices, payment schedule and list of essential spares for 3 year trouble free operation. The deviation statement and checklist shall be filled in and enclosed, without which the bid will not be considered.

Techno commercial bid with Price Details shall be rejected

7.2. Part – II Price Part of The Bid for the Work

Envelope shall be marked with following:

<u>PART-II: COMMERCIAL BID</u>	
Name of client	: Satish Dhawan Space Centre SHAR Indian Space Research Organisation
Title of the proposal	: “Planning, Design, Fabrication, Supply, Erection and Commissioning of Pre-Engineered Steel Building Including Civil, Electrical & AC Works for Entrance Plaza at Visitors Complex, Sriharikota.”
From (Name of the bidder with address)	:

- a) This envelope shall comprise one original plus three copies of "Schedule of Prices" duly filled in all respect. This envelope shall be sealed subscribing ***“DO NOT OPEN”***. Any other terms and conditions given in this part shall not be considered and if insisted upon by the Bidder, bids are liable for rejection.
- b) Priced commercial bid shall contain schedule of prices duly filled in, signed and stamped. No deviations, terms and conditions, assumptions, conditions, discounts etc. shall be stipulated in price bid. Department will not take cognisance of any such statement and may at their discretion reject such bids. SDSC SHAR may open Part – I of the bid on the due date of opening subject to meeting the minimum evaluation criteria. Price Bids (Part-II) of technically and commercially acceptable offers shall be opened at a later date.
- c) Unit rate for each of the item shall be indicated separately. The rate quoted shall be on FOR DESTINATION BASIS i.e., FOR SDSC SHAR, Sriharikota basis. Even unloading of the material at our site shall be your responsibility. Thus transportation of material from your works to SDSC SHAR and unloading at our site shall be the responsibility of tenderers. Department will provide the required material handling equipment at free of cost based on then availability.
- d) If the offers submitted by the tenderers are silent on taxes, it will be presumed that quoted rates are inclusive of taxes & duties and no claim in this regard will be entertained later.
- e) Supplier has to consider entire bill of material required for erection and commissioning complex as per the approved drawings/schematics.
- f) SDSC SHAR reserves the right to reject any or all the Bids without assigning any reasons thereof.
- g) Total amount shall be spelled out in terms of figures and words also.
- h) Department reserves the right to reject any or all the Bids without assigning any reasons thereof.

PART I – GENERAL INFORMATION & STANDARD CONDITIONS OF RFP

S.No	Description	Vendor Compliance						
1.	Prices quoted should be on the basis of F.O.R. SDSC SHAR, Sriharikota, The purchaser will not pay separately for transit insurance. All risks in transit shall be exclusively liable on the contractor and the purchaser shall pay only for such stores as are actually received in good condition in accordance with the PO.							
2.	LIQUIDATED DAMAGES: In the event of the Supplier failing to complete the work within the delivery period specified in the contract agreement or in extension agreed thereto, the Department shall reserve the right to recover from the Supplier as liquidated damages, a sum of 0.5 percentage per week or part thereof of the undelivered portion of the total contract price of equipment or work. The Total liquidated damages shall not exceed the 10.0 percentage of the total Contract.							
3.	OFFER VALIDITY: Bid shall remain valid for acceptance for a period of THREE months from the due date of submission of the Bid. The Bidder shall not be entitled during the said period to revoke or revise his Bid or to vary the Bid except and to the extent required by SDSC SHAR in writing. Bid shall be revalidated for extended period as required by SDSC SHAR in writing. In such cases, unless otherwise specified, it is understood that validity is sought and provided without varying either the quoted price or any other terms and conditions of Bid finalized till that time.							
4.	GST (Composite): Reduced GST @ 5% is applicable as per the Notification No.47/2017 and 07/2018. Please indicate the GST on supply items accordingly. If not indicated it will be presumed that GST @5% is inclusive of your quoted prices.							
5.	INCOME TAX: Income tax at the prevailing rate and as applicable from time to time shall be deducted from the supplier's bills as per Income Tax Act. and a certificate will be issued (TDS Certificate).							
6.	DELIVERY SCHEDULE: The building shall be completed within a period of 75 days from date of issue of order/letter of intent. Only the bidders who are agreeing to carry out the work within the stipulated completion period shall participate. <table border="1"> <thead> <tr> <th>Sl. No.</th><th>Description of Mile stone</th><th>Time allowed in days (from date of start)</th></tr> </thead> <tbody> <tr> <td> </td><td> </td><td> </td></tr> </tbody> </table>	Sl. No.	Description of Mile stone	Time allowed in days (from date of start)				
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S.No	Description	Vendor Compliance	
	I. DESIGN & DETAILED ENGINEERING		
	1. Submission of Design basis report (DBR) and STAAD/ ETABS models for structural works cleared by IITs, NITs or any other agencies with prior approval of department		T + 7 days
	2 Submission of all working drawings (PEB, Civil etc)		T + 10 days
	II. EXECUTION OF WORK		
	1. Completion of foundation work & Podium structure		T + 40 days
	2. Completion of PEB work		
	a) Columns, Portals		T + 45 days
	b) External PUF wall		T + 50 days
	3 Other Civil & PH works		T+ 55 days
	4 ACP cladding & Glazing		T+ 60 days
	5 Electrical works		T+ 65 days
	6 AC works		T+ 70 days
	III. COMPLETE HANDOVER OF GALLERY		
	1. Commissioning and complete handing over of Building as per the scope		T+75days
	The time for the date of delivery of the stores stipulated in the purchase order shall be deemed to be the essence of the contract and all the works as per the scope must be completed no later than the date(s) specified therein. Failure to do so, without adequate justification may involve cancellation of the contract at the discretion of purchaser. The schedule as above is only indicative. However, Department prefers earlier delivery schedule in view of Project commitments.		
7.	RISK COVERAGE: The Supplier shall arrange comprehensive risk coverage at his own cost covering the value of equipment including transportation to the site from manufacturer's works, storage at site, fabrication, erection, testing and commissioning at site. The period of such coverage shall be up to contractual completion period or any extension granted by Department thereof.		
8.	WARRANTY WITH OPERATIONS SUPPORT: The VCB panel shall be guaranteed for a period of 12 months from the		

S.No	Description	Vendor Compliance
	date of commissioning. The supplier shall repair/replace damaged equipment without any extra cost during guarantee period. The supplier shall repair / replace the damaged equipment without any extra cost during the guarantee period. During warranty, Contractor shall maintain adequate spares so that equipment is not down for a period of more than 48 hours. During the warranty period supplier should provide and adhere to the following: a) The Warranty Period shall stand automatically extended for as long as defects remain to be rectified. Every time notice of defect is given, the contractor shall correct the notified defects within the period specified by Engineer-in-charge. b) During the warranty period, the contractor has to arrange for two visits (Six months once) for taking up maintenance of PEB such as Roof cleaning, checking of structural members, painting touch up, other equipment maintenance etc. c) The contractor shall provide comprehensive warranty for all equipment and accessories against any manufacturing defects/bugs. They shall maintain the equipment and repair/replace all the defective components at the installed site at no additional cost. d) Break down maintenance should be responded, a priority technician/engineer shall be deputed to site within 24 hours' time. e) Department will not provide any transport. f) Accommodation shall be provided on chargeable basis based on the availability.	
9.	Earnest Money Deposit: Bidders are required to submit Earnest Money Deposit (EMD) for amount of Rs 5,00,000/- (Rupees Five Lakh only) in a single installment through Demand Draft (DD)/Bankers Cheque/ Fixed Deposit Receipts or Bank Guarantee from any of the Nationalised/Scheduled Banks executed on non-judicial stamp paper of appropriate value. In case of Bank Guarantee, it shall be valid for a period of 90 days beyond the final tender validity date. It shall be taken in favour of Sr. Accounts Officer, SDSC SHAR payable at State Bank of India, Sriharikota branch. Any tender not accompanied with EMD shall be treated as invalid tender and rejected. MSME registered vendors with NSIC or vendors who have already applied for renewal of registration, Central PSUs/PSEs/Autonomous Bodies, KVIC, National Small Industries Corporation, etc., shall be	

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	exempt from the payment of EMD. Vendors seeking exemption from payment of EMD shall submit necessary documentary proof. EMD of a vendor shall be forfeited if the tenderer/Contractor withdraws or amends his tender or deviates from the tender in any respect within the period of validity of the tender. Failure to furnish security deposit/performance bond by a successful vendor within the specified period shall also result in forfeiture of EMD. EMD shall be refunded to all the unsuccessful vendors within thirty days after placement of the Purchase Order. EMD shall be refunded to the successful tenderer/Contractor after payment of the Security Deposit or may be adjusted against the Security Deposit. EMD shall be refunded to all the participants in cases where the tender is cancelled or withdrawn by the Centre/Unit, within thirty days from the date of such cancellation or withdrawal.	
10.	SECURITY DEPOSIT The supplier, whose tender is accepted, shall be required to furnish by way of Security Deposit for the due fulfillment of the contract such a sum as shall amount to 10 % of the contract price of the work awarded. The security deposit (bearing no interest) shall be held by the Department as security till satisfactory completion, testing and handing over of all the system and for the due performance of all suppliers' obligations under the contract as per delivery period or extension granted thereof by the Department. The supplier within 10 days of Purchase Order or signing of Contract , deposit with the Accounts officer, Satish Dhawan Space Centre SHAR, Sriharikota as detailed above by any one or more of the following modes namely - By a crossed demand draft in favour of Accounts officer, Satish Dhawan Space Centre SHAR drawn on SBI and payable at Sriharikota. - By an acceptable bank guarantee. The bank guarantee shall be from a nationalized bank/scheduled bank& shall be valid for 90 days beyond completion period. In case of breach of contract, the Security deposit shall be forfeited in addition to other relief available to the Department under this contract.	
11.	MODE OF PAYMENT Our Bankers are State Bank of India, SDSC SHAR, Sriharikota – 524	

S.No	Description	Vendor Compliance																																													
	124. You may furnish your banker details for transferring the payments through ECS mode																																														
12.	TERMS OF PAYMENTS General guideline TERMS OF PAYMENTS are as indicted below. Any deviation to these payment terms to be brought out. <table> <tr> <th>Sl. No.</th><th>Stages</th><th>Stage wise Percentage for payment (on quoted amount)</th></tr> <tr> <td>1)</td><td>On completion of Design & detailed Engineering</td><td>5%</td></tr> <tr> <td>2)</td><td>On completion of substructure up to plinth beam level</td><td>10%</td></tr> <tr> <td>3)</td><td>On completion of structural work</td><td></td></tr> <tr> <td></td><td>a) Columns & Portals</td><td>10 %</td></tr> <tr> <td></td><td>b) Purlins, bracings, Tie beams, mezzanine deck slab</td><td>10%</td></tr> <tr> <td></td><td>c) Roof sheeting</td><td>8%</td></tr> <tr> <td></td><td>d) PUF walls</td><td>6%</td></tr> <tr> <td>4)</td><td>On completion of Floorings</td><td>10%</td></tr> <tr> <td>5)</td><td>On completion of Special Items</td><td>10%</td></tr> <tr> <td>6)</td><td>On completion of Podium works</td><td>8%</td></tr> <tr> <td>7)</td><td>On completion of Electrical works</td><td>10%</td></tr> <tr> <td>8)</td><td>On completion of AC works</td><td>8%</td></tr> <tr> <td>9)</td><td>On commissioning & handing over</td><td>5%</td></tr> <tr> <td></td><td>Total</td><td>100%</td></tr> </table>	Sl. No.	Stages	Stage wise Percentage for payment (on quoted amount)	1)	On completion of Design & detailed Engineering	5%	2)	On completion of substructure up to plinth beam level	10%	3)	On completion of structural work			a) Columns & Portals	10 %		b) Purlins, bracings, Tie beams, mezzanine deck slab	10%		c) Roof sheeting	8%		d) PUF walls	6%	4)	On completion of Floorings	10%	5)	On completion of Special Items	10%	6)	On completion of Podium works	8%	7)	On completion of Electrical works	10%	8)	On completion of AC works	8%	9)	On commissioning & handing over	5%		Total	100%	
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13.	PERFORMANCE BANK GUARANTEE a) The supplier shall guarantee for the performance of the contract by providing bank guarantee in favor of the Department for an amount equivalent to 10 % (ten percent) of the total value of this contract valid till the warranty period with a grace period of 2 months. b) The performance bank guarantee shall be submitted by the supplier with in fifteen days from the date of accepting the equipment/material as per the CONTRACT. The format for the performance bank guarantee shall be obtained from the Department. Department reserves right to forfeit the PBG in non-performance of the vendor.																																														

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14.	Bidder shall note that the conditional discounts would not have edge in the evaluation process of tenders.	
15.	Non-acceptance of any conditions where ever called for related to guarantee or warrantee, performance bank guarantee, liquidate damages are liable for disqualification of bids.	
16.	Wherever installation and commissioning is involved, the guarantee / warranty period should recon only from the installation, commissioning and acceptance.	
17.	Where counter terms and conditions / printed or cyclostyle conditions of sale have been offered by the tenderer, the same shall not be deemed to have been accepted by the purchaser, unless the purchaser's specific written acceptance thereof is obtained.	
18.	Quality and Workmanship: Raw materials used in the installation shall be uniform grade, new and exclusively developed, produced and supplied to meet site requirements. Workmanship will be suitable for the purpose intended and in accordance with the highest standards and practices.	
19.	Safety: All equipment shall be complete with approved safety devices. Wherever a potential hazard to personnel exists, provisions shall be made for safe access of personnel to the equipment/sub-assemblies during erection, operation and maintenance. Contractor at his own expense shall arrange and comply with the safety provisions as per ISRO safety manual (Schedule-'H') and health & sanitary arrangements for the workers as per the extent rules.	
20.	Test Certificates, wherever necessary, should be forwarded along with supplies.	
21.	The tenderer shall at all times indemnify the Purchaser against all clams which may be made in respect of the stores for infringement of any right protected by the patent Registration of design or Trade Mark and shall take all risks of accidents or damage, which may cause a failure of the supply from whatever cause arising and the entire responsibility for the sufficiency of all means used by him for the contract. The supplier has to coordinate with other agencies involved in realization of the substation and plan their commissioning works with absolute cooperation.	
22.	ARBITRATION: In the event of any question, dispute or difference	

S.No	Description	Vendor Compliance
	arising under these conditions of any condition in the purchase order, (except as to any matters the decision of which is specially provided for by these conditions) the same shall be referred to the sole arbitration approved by Director, SDSC SHAR. The arbitration shall be conducted within India as per the Arbitration and Conciliation Act, 1996 and the applicable language shall be English. The award of the Arbitrator shall be final and binding on the parties of this purchase order.	
23.	APPLICABLE LAW AND JURISDICTION The laws of India shall govern this purchase order for the time being in force. The Courts of Andhra Pradesh, India only shall have jurisdiction to be with and decide any legal matters or disputes what so ever arising out of the purchase order.	
24.	FORCE MAJEURE: Should a part or whole work covered under this purchase order be delayed due to reasons of Force Majeure which shall include legal lockouts, strikes, riots, civil commotion, fire accident, quarantines, epidemic, natural calamities and embargoes the completion period for work, equipment referred to in this agreement shall be extended by a period not in excess of the duration of such Force Majeure. The occurrence shall be notified within reasonable time.	
25.	PACKING & FORWARDING: The tenderer will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air, to withstand transit hazards and ensure safe arrival at the destination. The packing and Marking of packages shall be done by and at the expenses of the Contractor.	
26.	Site Visit: Bidder is advised to visit and examine the site and shall collect all other information which may be required for preparing and submitting the Bid and entering into the contract. Claims and objections due to ignorance of existing conditions or inadequacy of information shall not be considered after submission of the Bid and during implementation.	
27.	The firm will have to provide 02 sets of operational and maintenance manual in English language.	
28.	OEM Certificate: In case the Bidder is not the OEM, the agreement certificate with the OEM for sourcing the principal equipment and spares shall be mandatory. However, minor aggregates and spares can be sourced from authorized vendors subject to quality certification	

S.No	Description	Vendor Compliance
	and approval of Department.	
29.	Equipment needs to be manufactured on orders as per approved drawing and standards.	
30.	Inspection & Acceptance: a) No items shall be dispatched to SDSC SHAR without inspection and approval by the SHAR team unless such inspection is waived in writing by SDSC SHAR. b) Inspection and testing shall be conducted in approved manner satisfactory to Department. c) No item is to be delivered unless an acceptance certificate for the same has been issued by SDSC SHAR.	
31.	The main contractor shall be solely and entirely responsible for the work executed by sub-contractor(s) engaged by him for execution of Civil, Electrical and PH works in every respect including quality, progress, safety, compliance of contract / conditions, instructions, specification, discipline at site etc.	
32.	The main contractor shall ensure release of proper payment(s) to sub-contractor in time to maintain the progress of work. This shall not be linked to release of payment(s) to main contractor under the contract by the Department.	
33.	The main contractor shall give detailed execution programme of the work which will form part of his agreement with the department.	
34.	The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by Engineer-in-charge	
35.	The following information/documents are to be furnished online wherever applicable.	
	(a) Product literature	
	(b) Core banking account number	
	(c) PAN details in quotation and invoices	
	(d) GST Registration details.	

PART II

ESSENTIAL DETAILS OF ITEMS/ SERVICES REQUIRED

1. Introduction

Proposed Pre-Engineered building is a single storied structure of 12m clear height (including a part mezzanine floor) to be used for public utility purpose.

Visitors will be guided to this ENTRANCE PLAZA building which is the main entrance to the theme park, where they will follow the security procedures and safety regulations. Entrance plaza will consists of ticketing booth, security screening, cafeteria, souvenir shops, waiting area, washrooms, AV rooms, office space, information center etc. The building shall be functionally suitable for large public coming for the Visitor Complex. The building shall be aesthetically pleasing. The conceptual image of building is attached and the vendor shall make every effort to match with the concept.

Building shall be 'Planned, Designed, Fabricated, Supplied, erected, fixed and commissioned' as per approved construction/ working drawings and specifications. Architectural floor plans enclosed.

S.No	Parameter	Description	Vendor Compliance
a)	Approximate Area	Building: 3000 sq.m (ground floor) + 600 sq.m (mezzanine floor) = Total 3600sq.m All round the building there is Podium area of approximately 2300 Sqm is include under this scope.	
b)	Building Foot print size	56m x 53m.	
c)	Height	12m minimum height for most area of the building, for some portion the height is reduced to 10m to match with the elevation profile. (refer section/elevation drawings).	
d)	Basic drawings	- Refer Floor plan drawing No ISROVC-CCR-AR01-GR-01-248998, 248999 - Refer Section drawing No ISROVC-CCR-AR02-02-50-249058, - Elevation drg ISROVC-CCR-AR02-01-01-249026, ISROVC-CCR-AR02-01-02-249028. - Other drawings such as flooring, false	

S.No	Parameter	Description	Vendor Compliance
		ceiling etc is also attached for assessing the areas. Interested parties may visit the site (with prior permission from Department) before quoting.	

2. Scope of the Works

2.1. Works under Dept. Scope

S.No	Description	Vendor Compliance
a)	Clearances for design, fabrication drawings, dispatch, etc.	
b)	Detailed architectural drawings will be provided by Department	
c)	Electrical power can be extended by Department on chargeable basis. Normal power supply will be extended at one point (415V, 3 phases, 50 Hz). However onward distribution shall be by contractor	
d)	Pre-delivery inspection	
e)	Limited accommodation will be provided based on the availability	

2.2. Works under Vendor Scope

S.No	Description	Vendor Compliance
a)	Scope of work includes site visit, survey, excavation, filling, planning, designing, fabricating, supplying, erecting, fixing and commissioning of PEB steel building including necessary RCC foundations, Civil works, Electrical, AC works as per approved construction/ working drawings and specifications.	
b)	Detailed planning and design of Structural Elements, Plumbing works, Electrical and AC works are in the scope of the vendor, which shall be carried out as per relevant standards and specifications.	
c)	The structural design proof checking of PEB shall be got done by the contractor through reputed institutions like IITs, NITs or any other agencies with PRIOR approval of Department	
d)	The work involves PEB structure for whole building, as per the drawing enclosed. Furniture and workstations are not included in the present scope of work.	

S.No	Description	Vendor Compliance
e)	Provision for providing services for PH, Electrical and AC requirements shall be planned and embedded in the design.	
f)	PEB work includes main portal frames, primary members, secondary members, deck sheeting (with proper shear connectors as per IS), bracings, roof sheeting, purlins, girts, side panel walls/ sheeting on both face of columns, joineries, partition walls etc., <i>(Panel walls shall have provision for electrical, telephone, network lines, cutouts for switches, sockets etc.,)</i>	
g)	Civil works involve sub-structure for PEB, metal deck RCC slab, false ceiling, flooring, external ACP cladding, glazing, joinery, finishes, masonry toe wall, masonry wall in toilets, dado in toilet, Water Proofing works in toilet, Development works all-round podium, entrance and rear side steps, planter boxes, Pergola steel structure with ACP cladding for architectural feature etc.,	
h)	PH works involve internal & external water supply, sewage disposal etc.,	
i)	Internal & external electrification works including light fittings, distribution boards, LT panels, power supply to AC loads, emergency and UPS power supply distribution system, cable management system, smoke detection & fire alarm / Hydrant, earthing, Lighting Protection System etc.,	
j)	AC work involves supply, installation, testing and commissioning of AC system	
k)	Portable Fire Extinguishers (a) Design, Supply, Installation and distribution of portable fire extinguishers in terms of their numbers and types shall be done in accordance with IS 2190 (latest edition). (b) Design standard of each type of extinguisher shall be as per the latest IS. (c) Make: Minimax / Safex /Zenith / Nitin / Firex / Cease fire / Usha / Intime are preferable. If any other makes / models, the technical details shall be furnished for evaluation.	
l)	Fire Hydrants Design, Supply and Installation of Fire hydrant pipelines with external and internal hydrant points and hose reel drums with rubber hose along with nozzle guns as per the latest NBC / NFPA / TAC / BIS or IS standards.	

S.No	Description	Vendor Compliance
m)	The technical specifications, design considerations and Scope of work given in the tender document are for the general guidance of the Tenderer and shall not be considered as exhaustive.	
n)	Structure shall be designed for the satisfactory performance of the functions for which the same is to be constructed.	
o)	Details/ specifications not appearing in the list, but required to complete the work, shall be considered as part of the Scope and Tenderer's offer shall be considered to include the same.	
p)	Any miscellaneous materials, which are found essential for technical completion of the contract but not mentioned explicitly in this specification, shall be deemed to be included in the specification. Accordingly, such materials shall be included by the vendor as part of the offer	
q)	If the Tenderer contemplates any variation in specifications/ scope described in the tender specification document, the same shall be clearly mentioned in a separate statement attached with Technical bid	
r)	All structural steel shall be cleaned off rust and milled scale.	
s)	All structural steel work shall be carried out as per IS 800:2007	
t)	All the members, fittings, schemes etc., shall be designed & got cleared before execution	
u)	The tests shall be carried out in the presence of Dept. Inspection Panel (CLIP) before dispatch from their works and during commissioning of the same.	
v)	The scope of work shall include all transportation of the required materials and their accessories to the site of work with utmost care in handling.	
w)	All loading and unloading arrangements shall form part of the part of the scope and all required man power shall also be provided by the agency for unloading / shifting of the transformers over the plinth, assembling all accessories and installing in position as required.	
x)	The supplier shall be responsible for handling and ensuring safe custody of the materials and accessories from the time of supply at site till installation, testing and commissioning and handing over the same to the department on satisfactory completion of work.	
y)	The supplier shall co-ordinate with other agencies during the course of the installation as applicable and to ensure the safe commissioning.	

S.No	Description	Vendor Compliance
z)	The works of installation, testing and commissioning shall be done by employing qualified competent engineers / supervisors and all instructions of the department shall be strictly followed for the completion of work with good workmanship as required and regulations and other mandatory requirements.	
aa)	Any mandatory requirement specified by the inspecting authority like CEA (minor in nature) shall be carried out without any additional cost which is also a part of work.	
bb)	The department shall reserve the right to accept / reject any part of work, which is not acceptable as healthy engineering practice of carrying out such work as the case may be. In case of any failure to carry out the scope of work in time as per the instruction of department the work shall be carried out / got done by the department at the cost and risk of the agency and the entire amount with supervision charges shall be recovered from the agency.	

3. Design & Construction

Following are the brief indicative specifications and design considerations. The bidder shall follow all relevant Bureau of Indian Standards for design and detailed engineering and the same shall be considered in quote. Note: Only latest version/ revision shall be followed for all the codes.

3.1. Architectural

S.No	Description	Vendor Compliance
f)	As per the Architectural drawings (finalized by Department) enclosed.	
g)	Finished floor level shall be +1200 mm from FGL.	
h)	Ground floor: Entire flooring shall be with cement concrete base with soling. Finished with vitrified tiles, granite, IPS, false flooring of standard makes as indicated in the flooring layout plan drawing.(ISROVC-CCR-AR01-GR-01-248998)	
i)	Mezzanine floor: Deck slab with structural decking with proper shear studs/ connectors as per first floor plan drawing(ISROVC-CCR-AR01-01-01-248999) finished with RCC slab. Finished with floor finishes of standard makes as indicated in the flooring layout plan drawing.(ISROVC-CCR-AR14-GR-01-249950).	
j)	Walls: i) External wall consists of two layers on either face of column – Outer face of column: 200mm thick Solid concrete block masonry toe wall upto 900mm height from FFL and above	

S.No	Description	Vendor Compliance
	which ACP cladding or Structural glazing as per architectural drawing. – Inner face of column: Double skin 100 mm thick PUF insulated panels ii) Internal partitions: Double skin 75 mm thick PUF insulated panels iii) Toilet: 200mm thick Masonry Solid concrete block masonry wall of full height with all finishes including plastering, putty, painting, dado, tiling etc., <i>(Panel walls shall have provision for AC, electrical, telephone, network lines, cutouts for switches, sockets etc.)</i>	
k)	ACP Cladding: ACP cladding shall be provided as indicated in the architectural drawing. Also, all the exposed structural members, internal columns including staircase shall be cladded with ACP	
l)	Structural glazing: shall be provided as indicated in the architectural drawing.	
m)	Staircase: Staircase shall be of steel structure with granite for treads and riser & SS handrails as approved by Department	
n)	Acoustic treatment: In AV rooms acoustic treatment shall be designed and provided including wall paneling, false ceiling etc	
o)	Doors & Windows i) Entrance doors with 10mm thk toughened glass door with side & top glazing fixed and openable door at mid. ii) Metal door with PUF infill & view glazing iii) FRP doors for toilets iv) UPVC sliding windows with deco grills at all areas. UPVC ventilators with glass louvers and exhaust fan to be provided in toilets. <i>(for quantity of joineries, refer architectural drawing)</i>	

3.2. Structural

S.No	Description	Vendor Compliance
a)	The basic structural material chosen for the structural elements is RCC FOR FOUNDATION AND STEEL FOR SUPER STRUCTURE.	
b)	Foundation: i) Reinforced cement concrete CAST IN SITU or PRECAST isolated / combined footings shall be provided for supporting the structure based on site soil data and detailed design.	

S.No	Description	Vendor Compliance
	ii) The depth of foundation and safe bearing capacity shall be taken as 15 T/ Sq.m at 1.5 m depth below NGL or 20 T/ Sq.m at 2.0 m depth below NGL. iii) Back filling with local sand, sub base to flooring, Anti termite treatment.	
c)	Super-structure: i) Primary Members - Main frame (column and rafters) using high strength HR steel built up sections, having minimum yield strength of minimum 345 MPA or to suit design as per IS-800 specification. ii) Secondary Members - Purlins, girts and eave structures using Cold form members having minimum yield strength of 345 MPa or to suit design as per IS-801 specification and conform to the physical specifications as per IS-808. iii) Floor slab - Structural deck composite slab with proper shear studs. Minimum thickness of slab shall be 130mm. Scope of composite slab includes, supply and installation of Structural decking panel having minimum yield strength of 340MPa, Galvanized steel with Z275 as per IS 277 or equivalent standard including supply and fixing of shear studs conforming to IS:961-1975 Fe 540-HT of approved dia and length, at each valley of deck panel to beam, clinching male and female lip etc. iv) Bracing systems - Longitudinal cross bracing using tubular sections to provide lateral stability against wind as per design and IS code. v) Bolts - High Strength Tensile Hex Bolts and Nuts of 8.8 grade or equivalent. Anchor bolts as per IS 2062 or equivalent. Galvanized MS Hex bolts and Nuts of 4.8 grade or equivalent as per IS 1367. vi) Welds - All shop connection shall be welded with appropriate arc welding and shall be in accordance with IS-816, IS-819, IS-1024, IS-1261, IS-1323 IS-9595 as appropriate. The webs should be welded on to the flanges at both the faces at top and bottom of columns, beams and any other sections. vii) Sealant - Sealant used for cladding shall be butyl based two parts polysulphide or eaves, no staining materials are allowed. This is to be applied at all the side laps and end laps of roof panels and around. The sealer shall be non-plastic, non-shrinking, and non-toxic and shall be superior adhesive metals, plastics and painted at temperatures from 51 to 104 Degree Centigrade. viii) Closure - Solid or closed cell closures matching the profile of the panes shall be installed along the eaves, rails and other locations. ix) Gutters and down comers - Gutters and down spouts shall be	

S.No	Description	Vendor Compliance
	adequately designed to ensure proper roof drainage system. And shall be fabricated out of the same metal sheet; material shall be same as the sheeting. Down comers shall be UPVC with same profile covering. x) Painting and finishes - The primary and secondary steel shall be sandblasting / shot blasting to Sa2.5 and be coated with one coat of anti-corrosive primer 40 μ and two coats of anti-corrosive paint. xi) Structural steel framing and flashings / fascia around the openings for fixing lovers, vents, windows, doors, rolling shutters etc. considering the size of the rolling shutters, particular attention shall be paid to the design /size of the framing provided to support the rolling shutters. xii) Provision for laying of GI strips for earthing conductors for lightning arrester on roof shall be considered and designed. xiii) False Ceiling: False ceiling as per the specification in drawing need to be executed.	

3.2.1. Design Criteria

S.No	Description	Vendor Compliance
a)	Dead Loads - shall generally be determined in accordance with IS: 875	
b)	Imposed Loads - 4 KN/m ² shall be considered	
c)	Wind Loads - The loads due to wind shall be as per the provisions specified in IS 875 (Part 3) and IS 875-2015 Part 5. <u>Wind load parameters</u> i) Regional basic wind speed 50 m/s ii) Terrain Category 1 iii) Risk Coefficient, $K_1 = 1$ iv) Terrain, Height and Structure size factor, K_2 v) Topography factor, $K_3 = 1$ vi) Importance Factor for Cyclonic Region $K_4 = 1.30$ vii) Design life of the building 50 years viii) Directionality factor, $K_d = 1$ ix) Area Averaging Factor, $K_a = 1$ x) Combination Factor, $K_c = 1.0$ xi) The design wind speed and pressure is given below : Design Wind Speed $V_z = V_b K_1 K_2 K_3 K_4$,	

S.No	Description	Vendor Compliance																		
	Wind pressure is calculated as: $P_z = 0.6 V_z \cdot V_z$, Design Wind Pressure: $P_d = K_d \cdot K_a \cdot K_c \cdot P_z$																			
d)	Seismic Loads - Seismic design and detailing shall be in accordance with IS:1893, IS: 13920 and IS: 4326 as applicable. i) Building is located at Sriharikota, Andhra Pradesh, Zone – III, as per seismic zone map of IS 1893 (Part 1) – 2016. ii) Seismic Parameters iii) Zone Factor Z- 0.16 – Zone III iv) Importance Factor – I- 1.5. v) Response Reduction Factor shall be as per the code. vi) Damping ratio shall be as per Code																			
e)	Load Combinations and Partial Safety Factors: The structure and all components are generally designed for the combinations as per IS:800& IS 1893																			
f)	Environmental Exposure: The structure shall be designed for SEVERE exposure conditions. Special care has to be taken for steel members against corrosion attack																			
g)	Structural Concrete: i) Design Codes - Structural concrete shall be designed in accordance with the following standards: <table><tr><td>IS 456</td><td>Code of practice for plain and reinforced concrete</td></tr><tr><td>IS 875</td><td>Code of practice for design loads other than (part 1 to 3) earthquake for buildings and structures</td></tr><tr><td>IS 1893</td><td>Criteria for earthquake resistant design of structure</td></tr><tr><td>IS 4326</td><td>Code of practice for earthquake resistant design and Construction of buildings (Second Revision)</td></tr><tr><td>IS 3935</td><td>Code of practice for composite construction</td></tr><tr><td>IS4082</td><td>Recommendation on stacking and storage of construction materials and components at site</td></tr><tr><td>IS 6061</td><td>Code of practice for construction of floor and roof with joists and hollow filler blocks (Part – 1 to 2)</td></tr><tr><td>IS 6332</td><td>Code of practice for construction of floor and roofs using precast doubly-curved shell units</td></tr><tr><td>SP7</td><td>National Building code of India 2005: Part 7</td></tr></table>	IS 456	Code of practice for plain and reinforced concrete	IS 875	Code of practice for design loads other than (part 1 to 3) earthquake for buildings and structures	IS 1893	Criteria for earthquake resistant design of structure	IS 4326	Code of practice for earthquake resistant design and Construction of buildings (Second Revision)	IS 3935	Code of practice for composite construction	IS4082	Recommendation on stacking and storage of construction materials and components at site	IS 6061	Code of practice for construction of floor and roof with joists and hollow filler blocks (Part – 1 to 2)	IS 6332	Code of practice for construction of floor and roofs using precast doubly-curved shell units	SP7	National Building code of India 2005: Part 7	
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SP7	National Building code of India 2005: Part 7																			

S.No	Description		Vendor Compliance
		Constructional practices and safety.	
	IS 822 (1970)	Code of procedure for inspection of welds	
	ii) Material Specification		
	Concrete	M30 Grade	
	Reinforcement	Shall be as specified in IS with high yield reinforcement ductile bars specified with a characteristic strength of 500 N/mm ² (Fe 500d bars) per latest codes.	
	iii) Material properties		
	Young's Modulus	E _c = 5000 * sqrt (f _{ck}) N/mm ² (Clause 6.2.3.1 IS 456)	
	Poisson's ratio	μ = 0.17; Coefficient of Thermal Expansion : 10*10 ⁻⁶ /deg C	
	iv) Deflection		
	Deflection Limit : Span / 250 (IS456 cl. 23.2 a) Lateral drift : Height / 500 (IS 456, cl. 20.5)		
h)	Structural Steel Work: i) Material Properties Young's Modulus : E _s = 200 KN/mm ² Coefficient of Thermal Expansion : 12 x 10 ⁻⁶ /deg. C (All structural steel section shall be of approved make/ brands like TATA, JSW etc.,) ii) Seismic Design / Detailing - shall be in accordance with IS1893 and IS 13920 The structure shall be designed based on Limit state method of design wherein all parts of the structure are so proportioned that it does not cross the limit states as per the latest codes.		
i)	Connections: Shall be as per IS 800 and applicable standards. i) Welds shall be in accordance with IS 822 and two sides welds in all members & joints. ii) Inspection of welds shall be done as per IS 822. iii) Dye penetration test shall be done at all shop welded and site welded joints. iv) Bolts – specifications of bolts are indicated in the material specifications.		

3.2.2. Analysis of Structures

S.No	Description	Vendor Compliance
a)	The structural analysis shall be carried out by using Standard Engineering Software like STAAD Pro, ETABS, etc	
b)	The structures shall be modeled as 3D – frames.	
c)	The structures shall be analyzed for individual load cases as described above, using state of the art software packages as required. Suitable load combinations shall be performed and the performance of the structures in various states of collapse and serviceability is checked accordingly.	

3.2.3. Design of Structures

S.No	Description	Vendor Compliance
a)	The design of the steel structures shall be based on the Limit State Method, conforming to IS 800 and design of RCC structure shall be as per IS 456 . The overall design is based on all relevant codes / standards and sound engineering practice.	
b)	The design of the various elements of the structures shall be made using software packages, and manual calculations.	
c)	Note: Only latest version/ revision shall be followed for all the codes mentioned here	

3.3. PH WORKS (ENVIRONMENTAL)

S.No	Description	Vendor Compliance
a)	Occupancy: approx. 2000 nos per day	
b)	<u>Water supply, Demand & Source:</u> i) System shall consist of distributing the required quantity of water at proper pressure through CPVC pipe for internal and external water supply, hand wash points and wherever required. ii) The water distribution to the facilities shall be by gravity feed system from the OHTs. The location of OHT shall be considered as per the drawing.	
c)	Toilet requirements: Green rated water saving fixtures like aerator taps / low flow faucets, pressmatic taps/sensor taps shall be provided. Fixtures shall be of approved make and numbers as per drawing.	

S.No	Description	Vendor Compliance
d)	<u>Wastewater Discharge:</u> i) Domestic drainage shall be designed as two pipe system as per IS Code and the minimum diameter of the vertical soil stack shall be 110 mm. The soil and waste stack shall be taken till roof to act as vent through roof. The soil and waste stack shall be taken concealed in false ceiling and anchored to the ceiling suitably. ii) All fixtures and appliances shall be fully trapped to prevent back flow of foul gases and odour into the toilets. Deep seal P traps i.e. 75 mm water seal shall be provided for floor drains. iii) Waste stack shall be terminated at ground level and shall be connected to inspection chamber through gully trap, whereas, soil stack shall be directly connected to the inspection chamber, which in turn shall be connected to existing nearby manhole identified by Department.	

3.4. ELECTRICAL WORKS

S.No	Description	Vendor Compliance
3.4.1.	Internal Electrification:	
(a)	Concealed / Surface Run Modular Wiring i) HGMS conduit inbuilt in puff panel with FRLS copper wiring & modular switches shall be considered. Where surface wiring is inevitable and adopted, the same shall be encased with appropriate capping arrangement and painted to match with wall / ceiling finish. ii) HGMS surface conduit is accepted where they are not directly exposed to interior of the facility room. iii) Where ever masonry wall / floor crossings are used for wiring, concealed HGMS conduit wiring shall be adopted. iv) Please refer the electrical light fittings layout and power sockets drawing which are indicative only. The necessary drawings for electrical light fittings layout and power sockets layout shall be submitted before finalizing fittings and other components / wiring accessories. v) Lighting Circuit – Each circuit for 8 points or 800 Watts vi) 5A Power Circuit – Each circuit for not more than 3Nos of 6A, 3Pin Switch & socket vii) 16 A Power Circuit - Each circuit for 16A, 3Pin Switch & socket shall feed to 1Nos of 5A/16A, 5Pin	

S.No	Description	Vendor Compliance
(b)	LED Light fittings i) The light fittings shall be designed to meet the minimum illumination level requirement in the specification enclosed and shall be suitable to the respective false ceiling arrangement. ii) Square Modular Light fittings – for 600x600 false ceiling grids - Equivalent to PHILIPS RC125B W60L60 1 xLED34S/830 NOC iii) Circular / Square modular 300 mm light fittings – for corridors and toilets iv) Mirror light fittings - for mirrors planned in Gents and Ladies Toilet v) Video Curtain Room - Suspended/surface IP20 LED PIR integrated dimmable luminaire vi) NOTE: Occupancy sensor shall be planned in Gents and Ladies Toilet vii) Please refer the detailed specification of LED light fittings.	
(c)	Double Height Area LED Light fittings i. The light fittings shall be designed to meet the minimum illumination level requirement in the specification enclosed and shall be suitable to the false ceiling arrangement. ii. Square Modular Light fittings – for 600x600 false ceiling grids– Equivalent to PHILIPS RC125B W60L60 1 xLED34S/830 NOC iii. Circular Spot – for displays and models – Equivalent to PHILIPS GD301B 1 xLED27S/830 MB iv. Wiring or cabling shall be planned for double height area light fittings and routed in powder coated perforated cable trays of suitable size NOTE: Occupancy sensor shall be planned	
(d)	Ceiling Fans i. Energy Efficient BLDC ceiling fans shall be considered in all non - AC areas except Toilets. ii. Please refer the detailed specification of BLDC Ceiling Fans..	
(e)	Exhaust Fans i. BEE 5 Star rated Exhaust Fans shall be planned for Gents and Ladies Toilets in each ventilation grids and shall be of light duty. ii. Heavy duty exhaust fan shall be planned for Kitchen with necessary louver arrangement on exterior wall. iii. Please refer the detailed specification of Exhaust Fans.	
(f)	Distribution Boards i. For extending Raw / UPS power supply to lighting and power	

S.No	Description	Vendor Compliance
	sockets. ii. Separate DBs shall be considered for lighting and Power Circuits and shall be located in Electrical Panel Room / at the load centres for optimum wiring length. iii. Separate DB shall be considered for UPS power distribution. iv. All distribution boards shall be provided with FP / DP RCBO of suitable leakage current tripping sensitivity / MCCB with Electronics Earth Leakage module as incomer.	
(g)	Feeder & Light fittings Cables i. Cable sizing for Distribution Boards shall be determined with provision for 25 % future loads after due considerations of necessary degrading factors and submitted for the approval from the department and the voltage drop not more than 3%. ii. Please refer the detailed specification of Power Cables.	
(h)	Earthing: Double Body earthing for distribution boards shall be considered with 25 x 3 mm GI strip	
(i)	Cable Tray and CMS i. Power Coated Cable Management system (CMS)/ Cable raceways shall be planned for routing exposed conduits & data / telephone cables / FDA cables and shall be matched with wall color. ii. Carbon Mesh cable tray shall be considered for routing the power cables. . iii. Please refer the detailed specification of CMS and Cable Trays.	
3.4.2.	EXTERNAL ELECTRIFICATION	
(a)	LT PANEL BOARDS i. Main MV Panel and Sub distribution boards shall be designed to suit the electrical panel room size. ii. All the panels shall have the following features: iii. All MCCBs / ACBs /MCCBs in electrical panel boards shall be microprocessor based and shall be capable to communicate all parameters using SCADA switch with MODBUS RTU / equivalent protocol. iv. Suitable rating for Surge Protection Device in Incomer side	
(b)	Incoming Power Supply Cable i. LT power supply tapping source shall be considered as 500 mtrs away from the facility. ii. Cable sizing for Distribution Boards shall be determined with	

S.No	Description	Vendor Compliance
	provision for 25 % future loads after due considerations of necessary degrading factors and submitted for the approval from the department and the voltage drop not more than 3%. iii. Please refer the detailed specification of Power Cables.	
(c)	Earthing i. All earthing stations shall be provided with 12mtr long 50mm dia Class-B GI pipe driven earth system in following configuration ii. 2Sets of 2x2 configuration (ie. 8nos of pipes) for combined body earthing of MV panels at every panel level which shall be interconnected using 32x6 mm GI strip for panel earthing and using 25x3 mm GI Strip / 8SWG GI wire for DBs	
(d)	Hume Pipe and Cable Chamber: Hume pipe shall be planned inside the building with cable chamber of 600mm x 600mm for routing incoming cable and other cables in future	
(e)	UPS Power Supply i. 40 kVA 3phase 50Hz parallel redundant (2module configuration) UPS System with AVR on by pass supply , Isolation Transformers on output side with necessary maintenance batteries to ensure 30minutes backup for full load is in the scope of the work. UPS specifications and Design parameters shall be submitted for approval of the Department. ii. All computer points shall be considered under UPS power supply. Emergency lighting at least at 10% in overall lighting shall also be considered on UPS. However every room shall have at least one light fitting on UPS. iii. UPS input power supply, UPS output panel and UPS power Distribution shall be considered. UPS and UPS batteries shall be accommodated separately with fire partition barrier between them	
3.4.3.	LIGHTNING PROTECTION	
(a)	Earth Pits / Grids: All earthing stations shall be provided with 12mtr long 50mm dia Class-B GI pipe driven earth pipes in 1x2 matrix configuration consisting 2nos of pipes for each down conductor.	
(b)	Roof and Down Conductor i. Lightning Protection System shall be designed as per IS/IEC 62305-3 (with latest amendments) with minimum grid of 10mx15m. ii. Roof conductor shall be of Aluminium bare strip/ round conductor and Down Conductor shall be 25x3mm GI strip interconnected with necessary bimetallic connectors.	

S.No	Description	Vendor Compliance
	iii. Test link shall be provided for each down conductor.	
(c)	Ground Conductor: Ground conductor shall be GI strip minimum 25x6 mm.	
3.4.4.	AREA LIGHTING: i. Area lighting shall be planned with LED flood light fitting controlled by timer. ii. Polycarbonate Weather Proof box shall be planned for individual light fitting control of suitable size with IP65 protection including provision of MCB. iii. Separate Area Light DB shall with timer be planned for area light power distribution and located in Elec Panel room	
3.4.5.	TELEPHONE / LAN / CCTV WORKS: Necessary wiring / cabling provision shall be incorporated to cater for Telephone / LAN / CCTV / FDA system as the respective layout drawings / inventories.	
3.4.6.	Fire Alarm & Smoke Detection system i) Analogue addressable /intelligent detectors Smoke Detection System shall be considered in all areas above false ceiling and below false ceiling / false flooring, Duct detectors, Heat Detectors, Beam detectors, Fault isolator, Response indicators compatible to FACP as per latest NBC/IS. ii) Micro processor based Analogue Addressable fire alarm control panel (FACP) with network card, LCD display, access levels and event history logging with back up battery shall be considered at common location and shall be integrated with BMS. iii) Manual call points and hooter shall be considered at each & every entrances and exit locations. iv) Make: Morley / Hochiki / Edwards / Ravel / System Sensor / Notifier / Seimens are preferable. If any other makes / models, the technical details shall be furnished for evaluation. v) The supply and installation of the entire FDA system shall confirm to IS 2189 / BS 5839 / NFPA 71 & 72 /TAC norms. vi) All equipment and systems shall tested and approved by LPCB / UL / FM / relevant IS / EN standard.	
3.4.7.	AC POWER DISTRIBUTION: i. Separate Power distribution shall be considered for air-conditioning loads including necessary panel boards, A/C points etc.	

S.No	Description	Vendor Compliance
	ii. Split /Cassette air-conditioning (AC) point shall be provided at convenient height as per the layout.	
3.4.8.	WARRANTY: i. The LED light fitting and its driver unit etc. shall have warranty for a period of 5 years from the date of installation and commissioning etc. ii. All other electrical equipment shall have a minimum warranty of one year from the date of commissioning.	
3.4.9.	Detailed Technical Specifications are attached as Annexure A	

3.5. AIR CONDITIONING

Entrance Plaza is planned for entry of visitors to space theme park. Accordingly Entrance plaza is planned with 3000 Sqmt floor area and height of the building 10 to 12 Mtrs. Hence Air conditioning is proposed with 27°C inside the entrance plaza to maintain comfort environment.

Sl. No	Description	Vendor Compliance												
1.	Air conditioning is planned with 6 Numbers of 50HP VRF system connected Air 6 Numbers of Handling units and connected Ducting.													
2.	Design temperature inside the entrance plaza is 27 degree C.													
3.	Climatological data for SHAR: <table border="1"> <tr> <th>Season</th><th>DBT °C</th><th>RH %</th></tr> <tr> <td>Summer</td><td>42.2</td><td>35</td></tr> <tr> <td>Monsoon</td><td>28.3</td><td>88</td></tr> <tr> <td>Winter</td><td>18.3</td><td>60</td></tr> </table>	Season	DBT °C	RH %	Summer	42.2	35	Monsoon	28.3	88	Winter	18.3	60	
Season	DBT °C	RH %												
Summer	42.2	35												
Monsoon	28.3	88												
Winter	18.3	60												
4.	Contractor has to submit the Design report for AC works with bill of quantities for approval of Department													
5.	Schedule of quantities given at Section 3.5.1 are minimum required and are indicative and may change as per the site condition. However successful contractor shall supply the material as per the site condition													
6.	Fabrication, erection, commissioning and testing of the system shall be done as per the instructions of the Engineer in Charge													
7.	After integration, trial run shall be carried out for two different seasons. Initially on commissioning 72 hours' performance test and 24 Hours testing in subsequent season													

4. MATERIAL SPECIFICATIONS

Broad indicative specifications of key components are tabulated below. *(All member specifications indicated below shall subject to conforming to detailed engineering and design).* **The approved makes for Civil, Electrical, AC and other works are provided in Annexure B**

4.1. CIVIL MATERIAL SPECIFICATIONS

Sl. No	Components	Required Specification	Vendor Compliance
1.	Primary Members	I section or Box section or Cross beam section members.	
		High Strength HR Steel – IS 2062:E250/350/410 or equivalent with minimum yield strength of 345 MPA	
2.	Secondary Members (Roof purlins/ Wall grits/ Eave struts)	Z-purlins or C-purlins	
		Purlins should be of Pre Galvanised steel of 345 MPA having coating thickness of 275 gsm and Conform to the specifications as per IS-801 & IS-808.	
3.	Walls	i) External wall consists of two layers on either face of column ii) Outer face of column: 200mm thick Solid concrete block masonry toe wall upto 900mm height from FFL plastered & painted neatly and above which ACP cladding or Structural glazing as per architectural drawing. iii) Inner face of column: Design, Supply, Installation, Testing and Commissioning of 100 mm thick PUF Panels Made of 0.5mm thick Color Coated Galvalume Sheets on Either Side inclusive of necessary Supporting Frame as per design, base runners etc., including all accessories & Cutouts Provisions iv) Internal partitions: :Design, Supply, Installation, Testing and Commissioning of 75 mm thick PUF Panels Made of 0.5mm thick Color Coated Galvalume Sheets on Either Side inclusive of necessary Supporting Frame as per design base runners etc., including all accessories & Cutouts Provisions v) Toilet: Masonry wall of full height with all finishes including plastering, putty, painting, dado, tiling etc., <i>(Painting and wall tiles shall as per Department approval)</i>	

Sl. No	Components	Required Specification	Vendor Compliance
4.	Floor/ Roof slab	Composite RCC deck slab with shear studs for mezzanine area. Steel decking panel having minimum yield strength of 340 MPA, galvanized steel with Z275 (min 275 g/Sq.m zinc coating) as per IS 277 or equivalent standards. Structural decking panel of make TATA BLUESCOPE, JINDAL or equivalent. The shear studs/ connectors conforming to IS: 961-1975 Fe 540 HT to be provided. High bay roof: Galvalume sheet roofing with 40mm thick PUF insulated panel	
5.	Flooring	i) Flooring of approved make as per the flooring layout drawing. (ISROVC-CCR-AR14-GR-01-249950). ii) Vitrified tile- Double Charged stain free vitrified tiles (600x600mm) 9 to 10mm thick tiles of light/ dark/ pattern colours, glossy/ matt finish (App area 3200 Sqm) iii) Granite Flooring- 18mm to 20mm thick mirror polished granite stone slab flooring of approved colour and shade using mirror polished granite stone slabs of size 1800mm x 1200mm / 1800mm x 2400mm and smaller sizes as per the site conditions.(black galaxy/ruby red/lacca red or equivalent as per Architect scheme). iv) Flamed Granite- 18mm to 20mm thick flamed finish anti skid surface granite stone slab flooring of approved colour and shade. (App area 2300 Sqm) v) Ceramic tile flooring and dadoing(2.1mtr Height) in concept design tiles 300 x450mm for toilets. vi) IPS FLOORING- Indian patent stone flooring with cement concrete 1:2:4, 40MM thk. vii) False flooring- Unitile USF-1200 Access Floor panel of size 604 x 604 mm shall be all steel welded construction or Equivalent. (App area 50 Sqm)	•
6.	External Finish	i) Aluminum composite panel cladding as per the architectural drawing. (App area 2080 Sqm) ii) ACP cladding with necessary Frame Work designed for Wind Loads mentioned in the tender document with metallic colour of approved shades made out of 4mm thick Aluminum composite panel material consisting of 3mm thick FR grade mineral core sandwiched between two Aluminum sheets (each 0.5mm thick). The	

Sl. No	Components	Required Specification	Vendor Compliance
		Aluminum composite panel cladding sheet is coil coated, with Kynar 500 based PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc.(Aluminium Frame Work & Cladding Work are included in bidders scope.) iii) Structural Glazing with Aluminium frame work as per below specifications and architectural drawing. (App area 710 Sqm) - Structural glazing/ACP Cladding designed for wind loads as mentioned in our Tender Document. - Glass: 10mm thick toughened tinted glass - Aluminum profiles color anodized as per design	
7.	Joineries (size and numbers as per drawing)	Windows - UPVC sliding windows with deco grills with sill and jamb as specified.	
		Ventilators - UPVC ventilators with glass louvers.	
		Glass Partitions: With 12mm thick toughened glass (app area 90 Sqm)	
		Doors: a. Entrance door with 12mm thick safety glass door with side & top glazing fixed and openable door at mid (Automatic sensor based). Adjoining areas with 12mm safety glass & Patch fittings (app area 90 Sqm) b. Metal doors with PUF infill & view glazing c. FRP doors with 35mm thick Shutter with necessary frame work for toilets.	
8.	Bolts	High Strength Tensile Hex Bolts and Nuts of 8.8 grade or equivalent.	
		Anchor bolts as per IS 2062 or equivalent.	
		Galvanized MS Hex bolts and Nuts of 4.8 grade or equivalent as per IS 1367.	
9.	Welds	i) All shop connection shall be welded with appropriate arc welding and shall be in accordance with IS-816, IS-819, IS-1024, IS-1261, IS-1323 IS-9595 as appropriate. ii) In case of built up sections - the web should be welded on to the flanges at both the faces at top and	

Sl. No	Components	Required Specification	Vendor Compliance
		bottom of columns and beams. iii) In case of standard sections – proper splicing as per design requirements shall be provided. iv) All connections and section shall be welded on two sides. Shear studs to be welded as per specifications and through an expert agent. v) The welds size shall be as per design. All the welds shall be tested as per IS 822.	
10.	Gutters and Down comers	Gutters and down spouts shall be adequately designed and provided to ensure proper roof drainage system. Gutters shall be fabricated out of the same metal sheet and cladded with ACP for aesthetics. Down comers shall be UPVC with same ACP covering.	
11.	Painting and Finishes to Structural steel	The primary and secondary steel shall be sandblasting / shot blasting to Sa2.5 and be coated with one coat of Epoxy primer and two coats of Epoxy paint.	
12.	Painting and Finishes to masonry surfaces	Masonry surfaces plastered with 15mm thick CM 1:4 and painted with Premium quality 100% Exterior acrylic emulsion Paint.	
13.	False ceiling	As per the drawing no.:ISROVC-CCR-AR12-GR-01-249935 i) 600X600Mmm Grid ceiling in Toilets with Calcium silicate board including Structural Steel Frame work if necessary. (app area 380 Sqm) ii) Metal false ceiling- as per drawing including Structural Steel Frame work if necessary (App area 500 Sqm) iii) Gypsum board false ceiling- as per drawing including Structural Steel Frame work if necessary (app area 800 Sqm)	
14.	Acoustic wall paneling	For AV rooms: Wooden fluted Acoustic panel board with fibreglass tissue backing with combination of Fabric all as per Architect scheme including Structural Steel Frame work if necessary. (app area 200 Sqm)	
15.	SS Hand rail	SS hand rail for staircase and entrance steps. SS 316 grade hand rail as per approved design. (app qty 1200 kg)	
16.	Water Supply	i) All cold water supply lines shall be CPVC SDR 11 grade conforming to IS:15778 having thermal stability for hot and cold water supply. ii) Make: Supreme/ Ashirvad/ Astral/ SFMC or equivalent	

Sl. No	Components	Required Specification	Vendor Compliance
		reputed make. iii) Water Tank: SMC Panel water tanks Comprising of 15000 litre capacity(01 No)+ 5000 Litre Capacity shall be provided as indicated in drawing.	
17.	Sewerage Lines	i) All sewer lines inside the building shall be PVC SWR Type B of 75 / 110 mm dia confirming to IS:13592 ii) All External Sewer lines shall be PVC SWR Type B of 160 mm dia confirming to IS:13592/ UPVC foam core pipes iii) Make: Supreme / Ashirvad or equivalent reputed make iv) Sewer lines duct shall be covered with suitable material like composite boards (shera plank)	
18.	PH Fixtures	i) All PH fixtures shall confirm to relevant IS codes ii) Make: Medium range from Jaquar / Cera / Kohler or equivalent reputed make	

4.2. AIR CONDITIONING SPECIFICATIONS

S.No.	Description	Qty	Vendor Compliance
1.0	Supply of VRF outdoor units (Air-cooled) comprising of single / multiple high COP scroll / rotary compressors with at least 1 No. on inverter scroll / digital drive for load modulation and to achieve energy savings, low noise propeller type aero spiral fan, Condenser coil, refrigerant shut off valves, safety devices, lead free PC boards suitable for operation on R410a and on 415 V+/- 10%, 50 Hz, 3 phase A/C supply. The microprocessor control panels of the outdoor units shall be compatible to the central IBMS system which may be proposed at a future date. Outdoor units of VRF system shall be suitable for ambient conditions at Sriharikota. Capacities of outdoor units shall be as under:		
1.1	Quoted rate is inclusive of 1st charge of refrigerant for the VRF system		
1.2	Minimum 50 H.P outdoor unit with Nominal cooling capacity of VRF system shall be 150KW	6.00	
	The location for outdoor units shall be as indicated in the Tender drawing. Note: VRF units shall be inclusive of electronic expansion kits with suitable digital thermostat control to connect to AHUs as specified in part B. Based on the temperature setting inside the conditioned area		

S.No.	Description	Qty	Vendor Compliance
	capacity of VRF system shall be modulated.		
2.0	Lifting, shifting, positioning, installation and commissioning of VRF Out Door Units. Prices quoted under installation shall be inclusive of pressure testing and commissioning with topping up of R410a and Outdoor units supporting arrangement with foundation block, supporting MS platform duly painted with two coats of Black paint.		
2.1	50 H.P outdoor unit with Nominal cooling capacity of VRF system shall be 150KW	6.00	
3.0	Supply of suitable Refnet joints to take care of connectivity and circuiting as detailed above and as per Tender drawing.	24.00	
4.0	Laying of control / communication wiring and connecting the IDUs and ODUs using 3C X 1.5 Sq.mm copper cable) through PVC conduit.	650.00	
5.0	Supply, installation and testing of Refrigerant copper piping with Hard drawn pipes insulated with nitrile rubber tubular insulation as specified below. Copper piping wall thickness shall be minimum 1mm to 1.2mm.		
5.1	41.3 mm OD (Insulation = 19mm thick)	400.00	
5.2	28.6 mm OD (Insulation = 19mm thick)	36.00	
5.3	19.1 mm OD (Insulation = 13mm thick)	400.00	
5.4	15.9 mm OD (Insulation = 13mm thick)	36.00	
6.0	Supply, installation of 14SWG GI tray with suitable support for laying the refrigerant piping and power cables etc.		
a	450 mm width	100.00	
b	300 mm width	200.00	
c	200 mm width	50.00	
7.0	Electrical works comprising of supply, installation, testing, and commissioning of complete power system and control system for the satisfactory operation of VRF out door units and Air handling unit.		
A	Electrical panel for 4 Numbers of 50HP capacity VRF units and 4 Numbers of Air Handling Units. Electrical panel shall be located in the AHU room.	1.00	
B	Electrical panel for 2 Numbers of 50HP capacity VRF units and 2 Numbers of Air Handling Unit. Electrical panel shall be located	1.00	

S.No.	Description	Qty	Vendor Compliance
	in the AHU room.		
	The distribution detail shall be as in indicated in the schematic diagram. The electrical work shall consist of the following:		
	<u>Panel:</u>	-	
	Indoor floor mounted cubicle, dead front type, main MV panel, dust and vermin proof, fully tropicalized construction, with 14 SWG CRCA sheet with necessary anti-corrosive treatment and powder coating of approved quality and colour.		
	The panels shall be suitable for operation on 415V, 3 phase, 4 wire, 50 Hz AC supply complete with all interconnections and consisting of the following:		
	(i) Main incoming MCCB of rating as indicated in SLD with 50 kA symmetrical breaking capacity, earth leakage protection, microprocessor based release and having door interlocking facility.		
	(ii) Metering: Digital Multi-function meter with CTs of suitable range as indicated elsewhere /SLD, Phase indication lamps with fuse and control		
	Multi-function meter shall be of digital type and possess the following features:- (a) Shall be of size 96 x 96mm (b) Display shall be LCD (c) Record and read voltage, current, frequency, power factor active power (P), reactive power (Q), apparent power (S) & THD (d) AC/DC auxiliary supply. (e) Real-time clock (RTC)		
	(iii) TPN Aluminium bus bar of suitable capacity, mounted on non-hygroscopic, glass fibre reinforced insulators		
	(iv) Outgoing MCCBs/ MCBs of capacity as indicated in the SLD along with starters (DOL/Star delta as applicable) contactors, O/L relay, single phase preventers VRF systems as indicated above. In case all the controls are provided in the VRF unit same need not be provided in the main panel.		
	(v) Electrolytic GI wire/strip on either sides of the panel including supply and fixing using MS/Aluminium spacers, saddles, welding with all fixing materials required when laid inside the building, including excavation & refilling of earth when laid outside the building and tinning of all the joints &		

S.No.	Description	Qty	Vendor Compliance
	terminations interconnections with earth pit and equipment, terminations/ interconnections in an approved manner as per IS 3043 (with latest amendments) including supply of all hardware's complete as required.		
	(viii) The earth leakage relay (ELR) of current sensitivity 0-300mA for the incomer.		
	(ix)The panel shall have necessary interface like 24 V DC/230 V AC relays, air break contactors etc to trip the MCCB controlling the incoming supply on receiving signal from smoke detection and fire alarm control panel which operates on 24 V DC supply. Required no. of NO/NC contacts with the LED shall be provided for visual (Actuation / off) indication of this trip signal along with a by-pass key type actuator (lockable in two positions)		
	Note: (i.) Necessary incoming cabling from FACP to 24 V DC relay in main panel will be provided by Department. (ii.) 24 V DC supply need not be provided by AC Vendor.		
	<u>Cabling and End terminations:</u>	-	
	(i) Supply and laying of 1.1 kV, XLPE insulated, overall sheathed, stranded armoured copper cable , flat steel strip/ wire armoured cables conforming to IS 7098: Part I (with latest amendments), complete as required. All power and control cables shall be laid in cable tray.		
	The cable shall bear ISI certification mark. The size and rating of the cabling shall be as indicated in the SLD. Cables shall be laid in cable trays of suitable size and shall include all necessary materials such as brackets, clamps, MS spacers complete as required and directed by EIC.		
	(ii) End terminations for 1.1 kV, XLPE insulated armoured copper conductor cables of size/rating as indicated in the SLD including supply of cable gland, lugs, neoprene bushes, other materials and tools required complete with terminal connections, earthing of glands, complete as required and directed by EIC.		
	(iii) Necessary cabling/wiring is to be provided for all control circuits in between panels, all equipment and remote control/monitoring panel. All indoor cabling/control wiring shall be run in cable trays. Exposed wiring shall be routed through MS Box sections. All power and control cables shall be laid in suitable cable trays.		

S.No.	Description	Qty	Vendor Compliance
	Notes for electrical panel works:		
	1. Fire and corrosion resistant coating shall be applied in two coats with necessary primer		
	2. Fire retardant DMC/SMC fillings for opening around bus-bar near the sectional barriers and Door interlocking facility for all compartments.		
	3. Facilities in the terminals to have direct termination with aluminium/copper cables. All terminations shall be made with proper lugs in the approved manner.		
	4. Shall have high mechanical strength		
	5. Shall be mountable in any position in vertical plane for operation and suitable for horizontal expansion in the future		
	6. Surface treatment to panel, frame and all steel parts of the panel shall be carried out through seven tank process		
	7. After surface treatment, panel shall be painted through powder coating process with two coats of zinc chromate primer and two coats of powder painting		
	8. Neutral link of full rating shall be provided for all incoming/ outgoing feeders		
	9. All MCCBs shall be with microprocessor release compatible for integration with SCADA/BMS		
	10. All exposed cables laid in trench /wall/ceiling/floor/trusses shall be provided with silicon based fire resistant coating compatible for PVC cables.		
	11. All components, panels, cables etc., and panel fabrication shall conform to relevant IS Specifications and shall also be got approved by engineer in charge.		
	12. Erection, testing and commissioning of the system and various components shall be done as per the relevant IS Specifications.		
	13. The electrical panel shall be got fabricated from approved manufacturers only. The list of approved panel manufacturers is enclosed.		
8	Minor civil works like cutting away and making good of openings in walls/ceiling etc: for passage of pipes, ducts, cables, etc. complete as required.		

4.2.1. AIR DISTRIBUTION SYSTEM

S.No.	Description	Qty	Vendor Compliance
1	Supply, installation, testing and commissioning of Double Skin vertical type Air Handling Units of Horizontal Configuration, 45±5mm thick panel with PUF insulation, MERV 13 filter section, min 6 row deep DX Cooling coil of copper tube & aluminium fins, copper header, AMCA certified centrifugal impeller with backward belt driven Centrifugal fan, motor, vibration spring isolator for fan and motor, factory assembled Aluminium volume control damper, internal power and control wiring, required length of power cable from the fan motor to terminal box which will be provided on the AHU to the equipment, GI base frame complete as per specifications as required. Fan motor shall be IE-3 type and suitable for 415±10% volts, 50 cycles, 3 phase .Noise level of the AHU shall be less than 70 dbA @ 1 mts distance. Inner and outer skin shall be 0.63mm thick GI sheet with powder coating or pre plastic coating.		
	AHU Cooling coil shall be suitable for connection of VRF system. Quoted rate is inclusive required number of Electronic expansion valves suitable digital thermostats. Thermostat should control the electronic expansion valves and communicate to the VRF system for modulating the capacity of the VRF system. Quoted rate is inclusive of AHU kit control boxes as required for satisfactory connection of VRF system and motorised damper for AHU outlet.		
A	Capacity: 40 TR, Dehumidified Air: 16000 CFM, ESP: 50mmWC with suitable motor. Motor capacity shall be considered minimum 20% higher than the required capacity.	6.00	
2	Supply, installation, testing and balancing of Air Distribution System consists of factory fabricated Galvanized Iron sheet metal ducting with TDF/TDC flanges complete with supports (anchor fasteners and tie-rods, cradles, GI angle supports, GI bolts and nuts, 4mm thick self-adhesive neoprene rubber gasket, stiffeners, chipping and plastering of openings made for duct supports etc., filling the gap with fibre glass wool and with fire sealant complete as per specification. The rates quoted shall include turning vanes, straightening vanes, splitters, inspection doors , probe inlets with test openings enclosures		

S.No.	Description	Qty	Vendor Compliance
	complete with locking caps, chain, gaskets, insulating plugs, and extension for insulated ductwork etc.		
A	1.2mm thick GSS ducting (18G)	400.00	
B	1.0mm thick GSS ducting (20G)	300.00	
C	0.8mm thick GSS ducting (22G)	750.00	
D	0.63mm thick GSS ducting (24G)	400.00	
3	Supply, installation, testing & commissioning of factory fabricated GI spiral oval duct with necessary elbows, tees, brackets, supporting threaded rods, anchor fasteners etc.		
A	1.2mm thick GSS ducting (18G) – factory fabricated		
B	1.0mm thick GSS ducting (20G) – factory fabricated		
C	0.8mm thick GSS ducting (22G) – factory fabricated		
D	0.63mm thick GSS ducting (24G) – factory fabricated		
4	Acoustic insulation (at AHU outlet duct) with 25mm thick Fibre glass rigid board of density not less than 30-40 Kg/m ³ of Duct acoustic lining material shall be incombustible, inorganic, inert non- shedding glass fibre. Insulation shall be covered with RP Tissue and finished with 28 gauge aluminium perforated sheet.	240.00	
5	Supply and installation of Sound Attenuators consist of outer casing with 1.2m Long, sound absorbing material and internal baffles, splitters and supports as required. Casing shall be of 20 thick GI sheet. Sound absorbing material shall be high density fibre glass held in place with at least 5% compression to prevent voids due to settling. Absorption material density shall be minimum 48 kg/cum. Fibre glass faced with minimum 26G perforated GI sheet of minimum 40% open area.	30.00	
6	Supply and installation of FM approved & labelled thermal insulation - Material shall be physically cross-linked polyolefin foam insulation with factory applied reinforced aluminium foil facing on one side and self-adhesive backing. The density of the foam should be not less than 25kg/m ³ and the maximum thermal conductivity K should be 0.032W/mK@ 23 Deg C. The water vapour permeability should be better than 0.8gm/m ² /24hrs(90%RH.). The minimum fire rating property of the insulation material when tested to BS476 part6 & 7 should be Class 0. Insulation sheet joint tape shall be minimum 9 micron thickness & 50 mm width aluminium foil for vapor sealing of insulated ducts	1850.00	

S.No.	Description	Qty	Vendor Compliance
7	Supply and fixing of Extruded Aluminium, powder coated Supply air diffusers with removable centre core overall size 600 x 600mm with volume control dampers. The duct & diffuser shall be supported at the four corners with hanger / chain support.		
A	Neck size : 300 x 300mm		
B	Neck size : 375 x 375mm	20.00	
C	Neck size : 450 x 450mm	20.00	
D	Neck size : 525 x 525mm		
8	Supply and fixing of Extruded Aluminium, powder coated return air diffusers with removable centre core overall size 600 x 600mm without volume control dampers. The duct & diffuser shall be supported at the four corners with hanger / chain support.		
A	Neck size : 300 x 300mm		
B	Neck size : 375 x 375mm	20.00	
C	Neck size : 450 x 450mm	20.00	
D	Neck size : 525 x 525mm		
9	Supply and installation of Powder coated extruded aluminium continuous linear grilles. with Aluminium collar damper as per specifications and drawings	35.00	
10	Supply and installation of aluminium construction collar dampers with damper adjustment arrangement.	14.00	
11	Supply, installation, testing and balancing of GI louver volume control damper (low leakage) made out of 16G thick galvanized sheet steel frame and blades of 18G galvanized steel with suitable links, handles, levers and quadrants for manual control of volume of air flow and for proper balancing of air distribution system.	8.00	
12	Supply, installation, testing & commissioning of multi blade UL certified & labelled fire dampers with 74 deg C fusible link. The damper shall be of at least 120 minutes' fire rating with minimum 450 mm duct sleeve. The damper shall be as per UL 555; 1995 classified and UL approved.	16.00	
13	Supply and installation of Extruded Aluminium powder coated fresh air intake / outlet Louver complete with volume control damper, vermin netting and 45 deg angle suitable for protection	2.00	

S.No.	Description	Qty	Vendor Compliance
	against splashing rain water fixed in a powder coated Aluminium angle mount frames. Quoted rate is inclusive of Aluminium construction volume control dampers with opening and closing lever.		
14	Supply and installation of Fire Retardant Canvass connections for Ac equipment's like Air handling units /fans etc. with GI matching flanges on both sides with a provision of openable zip. The entire assembly shall be factory fabricated.	10.00	
15	Design, Supply and erection of steel supports for outdoor units like MS plate, angles, channels, Duct and pipe supports where continuous channel supports are required etc. Rate shall inclusive of cutting, welding, grinding, fixing accessories and one coat of primer & two coats of enamel paints, etc. as required.	5.00	

5. Field Quality Plan / Quality control system

S.No	DESCRIPTION	VENDOR COMPLIANCE
5.1.	The Vendor shall make arrangements for testing of all construction materials in accordance with FQP (Field quality control plan) as approved by Department (SDSC SHAR).	
5.2.	If required for this purpose, materials are to be tested at third party labs. For this purpose, the vendor has to arrange the sample materials for testing and pay necessary testing charges & Conveyance Charges which will not be reimbursed by the department.	
5.3.	Vendor shall deploy a well experienced quality control engineer to monitor all QC activities at site as per approved FQP.	
5.4.	Vendor shall submit periodic status report, on daily as well as weekly consolidated basis, to Department on the progress of the contract.	
5.5.	Department shall witness routine / acceptance tests performed at manufacturer works for the items supplied by vendor. Vendor shall accordingly provide inspection call to Department with submission of quality assurance plan in advance.	
5.6.	For the items bought out from dealers, test certificates, as per relevant IS / IEC standards, as issued by manufacturer shall be submitted to Department.	
5.7.	After receipt of PO, vendor shall submit GA drawings along with BOQ (item-wise description, quantity, make, model etc) of the architectural	

S.No	DESCRIPTION	VENDOR COMPLIANCE
	items.	
5.8.	Raw materials for steel sections, sheets etc shall be of reputed make. Vendor shall take prior approval from Department for the make prior to proceeding with procurement action.	

6. Special Conditions

S.No	DESCRIPTION	VENDOR COMPLIANCE
6.1.	Design:	
	i) The Architectural design and detailing of the building shall meet the requirements of various aspects of the room such as electrical, illumination, ventilation, exhaust, thermal, safety, security etc. o Accordingly, this shall include all items such as windows with Canopy shades & Grill, doors with shades/lock/key, rolling shutters with lock/key, ventilator provisions, exhaust provisions, rain water gutters/ down comers/ pipes etc.,.	
	ii) The PEB Design shall cover Main structure along with associated structural steel, cladding and roofing work insulation, Trims & Flashings, painting, metal fascia, metal gutter, rain water down comers, sun-shades, openings, etc. All the items contemplated shall be suitable for long life.	
	iii) The structural design proof checking of PEB shall be got done by the contractor through reputed institutions like IITs, NITs or any other agencies with PRIOR approval of Department.	
	iv) The architectural drawing showing the walls, roof column layout etc given in the tender relevant Drawing are to provide general idea about work to be performed under the scope of the contract. The PEB shall have robust water tightness at all joints and connections. The building shall have a high class durability and performance during the adverse weather conditions.	
	v) Fasteners used for fixing the sheeting panels shall be approved make self-tapping type with metal washer & neoprene washer and shall have matching colour hex. Head. Preferred make Corroshiled, Hilti or equivalent. In addition, the roof sheets shall be braced by providing additional wind ties for resisting the cyclonic wind forces as per the design.	

S.No	DESCRIPTION	VENDOR COMPLIANCE
	vi) Roof slope of the building shall be as per the tender drawings. This slope has to be confirmed by the Tenderer in respect of the guarantee against leakages sought vide a separate clause of this Document.	
6.2.	Work Schedule: After issue of LOI/PO, the agency within 5 days shall submit "Time Schedule" for completion of various portions of works. This schedule is to be within the overall completion period. The detailed programme in the form of a quantified bar chart or CPM network shall include all activities from start to completion	
6.3.	Drawings: i) Tender Drawings shall be the 'Basic' drawings for developing design drawings. Design drawings shall then be developed in to final 'Shop Drawings'/ 'Working drawings' to be prepared by the contractor.	
	ii) It shall be clearly understood that the Tender drawings are only informative drawings and are not intended to show exact and final information or specific connection details.	
	iii) The quantities of some special items indicated in the tender document are only indicative and minimum. The vendor has to calculate the areas of different items from the tender drawings and no extra payment will be done for increase in quantities based on design/ site conditions.	
	iv) In case of variations in 'Drawings' and 'Specifications', the decision of the Engineer in charge shall be final and binding	
	v) Contractor shall prepare all fabrication and erection drawings necessary for completing the work satisfactorily.	
	vi) Shop drawings shall include, but not be limited to detailed marking plans, Details member connections and connections to other structures and components of building, detailed dimensions for fabrication indicating dimensional modifications required for field conditions, Welding and bolting procedures to be used both at shop and field, Cambers required to be provided, and permissible tolerances in fabrication, Assembly and Erection sequences indicating components to be connected at field.	

S.No	DESCRIPTION	VENDOR COMPLIANCE
6.4.	Miscellaneous:	
	i) Cage Ladders with locking system (having same color as of cladding sheet) having small platforms with railing at intermediate levels and at top, to go up to the roof for maintenance shall be planned. Intermediate platform shall be located such that climbing height of cage ladder will not exceed 6m.	
	ii) Structural steel Framing and flashings/ fascia around the openings – for fixing louvers, vents, windows, doors shall be designed and provided. Necessary membranes at joints shall be included in design and scope.	
	iii) The building shall be made reasonably dust proof by providing Foam Filler at vulnerable areas such as Roof gutter and roof sheeting junctions Roof gutter and wall cladding junctions, Cladding sheet and brick wall junctions with drip trim etc.	
	iv) Whole roof and wall system shall be checked for water tightness by necessary water spray tests.	
6.5.	DEVIATIONS/ VARIATIONS EXTENT AND PRICING Contractor shall follow the drawings and designs approved by Department. i) Any variation in drawings (forming part of the contract) due to design/ site condition/ any other reasons (excluding specific additions ordered by Department) shall be specifically got approved by Department before execution. For such deviation in quantities/ specifications arising due to the above, the contractor is bound to execute such items at no extra cost to the employer. The cost of such items shall be deemed to have been included in the contract price quoted. ii) Entrustment of any additional/ extra/ substituted items of works contingent to main work and outside the scope of the contractor, will be authorized by the Dept. The price of such additional/ extra items will be regulated as below. iii) In the case of Extra/ substituted items (items that are completely new), the contractor may within 15 days of receipt of order or occurrence of the item(s), claim rate supported by proper analysis, for the work and the Engineer-in-charge shall within prescribed time limit of the receipt of the claims supported by analysis after giving	

S.No	DESCRIPTION	VENDOR COMPLIANCE
	consideration to the analysis of the rates submitted by the contractor, determine the rates on the basis of market rates and the contractor shall be paid in accordance with the rates so determined.	
6.6.	Project Completion and Handover: The vendor after Project Completion and during Handover shall provide the following: i) Clearing of site and handing over of all the works, as directed by Engineer-In Charge. ii) Maintenance of the completed work during the maintenance period, the "Maintenance Period" for the works done by contractor under this contract will be One Year from the date of actual completion of the particular work and handing over to Department. iii) The contractor shall submit to the Department "As Built" drawings in 3 sets of copies along with other related documents. iv) The contractor shall submit to the Department Issuance of stability certificate, ensuring structural stability and safety during and after construction.	
6.7.	Labour camp & Security: i) A suitable place will be identified by the department only to construct a Temporary office-cum-cement stores shed of the contractor for the duration of work and shall be demolished and site cleared on completion of work. A suitable place will be identified for construction of labour camp along with other labour camps in Keepakam area near Labour colony or other suitable place. ii) Work can be taken up round the clock with proper security arrangements by Contractors. For working on Sundays, holidays and late hours, even though permission will be accorded by the Engineer -in-charge, the contractor will have to make application to the Security Department also and keep them informed well in advance. iii) Any breach of above security regulations and rules in force from time to time will be viewed seriously. No claim whatsoever will be entertained by the Department on account of observance of security Regulations.	

PART III
EVALUATION CRITERIA & ANNEXURES

A. MINIMUM QUALIFICATION CRITERIA

The following are the minimum essential criteria to further validate/accept the bid. Vendor is requested to provide all the necessary supporting documents. If any deviation/non-compliances/lack of supporting document bid shall be summarily rejected.

Sl. No.	Clause Description	Compliance by bidder (Enclose Supporting Documents)
1.1.	The BIDDER should be a well-established and reputed manufacturer or firm in the field of Design & Realisation of PEB structure, with experience of minimum 5 years as on 31.03.2019 <i>Enclose Certificate of incorporation, Partnership deed, or Registration with Govt. Department or PSU or corporate Companies</i>	
1.2.	a) Bidder should have average annual turn-over of not less than Rs.1800 Lakhs during the last three financial years ending with March 2018.	
	b) As per the audited financial results, the bidder/firm should have earned profit continuously during the last three financial years ending with March 2018.	
	c) Latest solvency certificate from any Nationalized/Scheduled bank shall be submitted for a value of minimum Rs.600 Lakhs . The solvency certificate must have issued during the FY 2018 - 2019 .	
1.3.	Should have satisfactorily completed the similar works as mentioned below during the last Seven years ending previous day of last date of submission of bids. (<i>Similar Works Means: "Construction of PEB buildings as a HYBRID (Steel + RCC) STRUCTURE with high bay having minimum height of 7mtrs with minimum area of 1000 m² involving Civil, PH, Electrical, AC executed in the same contract as a composite work</i>) (a) Three similar works each costing not less than Rs.600 Lakhs (or) (b) Two similar works each costing not less than Rs.900 Lakhs (or) (c) One similar work costing not less than Rs.1200 Lakhs .	

Sl. No.	Clause Description	Compliance by bidder (Enclose Supporting Documents)
1.4.	Technical proposal of the bidder, which is not able to substantiate/satisfy the claims made by it with respect to the technical requirements laid down in this RFP, is liable to be rejected	
1.5.	The firm must provide a self-declaration that there is no complaint/vigilance inquiry against them in any Govt./Department /PSU and they have not been black listed by any Govt. Department/PSU.	
1.6.	Offers of those bidders taking full scope of the work (supply, installation and commissioning) as per the requirements indicated in the RFP only will be considered.	

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B. Evaluation Criteria. The broad guidelines for evaluation of Bids will be as follows:

S.No	Description	Vendor Compliance
1.0	In respect of Two-Bid system, the technical Bids forwarded by the Bidders will be evaluated by the Buyer with reference to the technical characteristics of the equipment as mentioned in the RFP. The compliance of Technical Bids would be determined on the basis of the parameters specified in the RFP. The Price Bids of only those Bidders will be opened whose Technical Bids would clear the technical evaluation.	
2.0	During evaluation, SDSC SHAR may request Bidder for any clarification on the bid, additional documents. If required department will visit the installation of bidder where similar system is installed and operational.	
3.0	Performance of Bidder on similar nature of works executed/ under execution shall be taken into consideration before selecting the Bidder for opening his price bid.	
4.0	The time schedule for completion is given in the Proposal document. Bidder is required to confirm the completion period unconditionally.	
5.0	SDSC SHAR reserves the right to reject any bid if technically/commercially not meeting the requirement/terms & conditions. Such decisions by the SDSC SHAR shall bear no liability whatsoever consequent upon such decision.	
6.0	Total price inclusive of all taxes and duties will be considered for arriving L1 and awarding the contract as per the procedures.	
7.0	If there is a discrepancy between words and figures, the amount in words will prevail for calculation of price.	
8.0	Offers of those bidders taking full scope of the work (supply and erection) only will be considered.	
9.0	SDSC SHAR shall not be obliged to furnish any information/clarification to unsuccessful bidder as regard non acceptance of their Bids	
10.0	Splitting of the order/WORK is not possible.	
11.0	As part of evaluation, Department officials may visit the similar installation of the bidder(s). Bidder should arrange all necessary permission from their client for the same.	

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VENDOR EVALUATION FORMAT

SDSC SHAR seeks response to the following questionnaire for assimilating data which would be used for evaluating the capability of the supplier for executing the referred work. Hence, the supplier is requested to provide only genuine data and any discrepancy found at a later point of time may result in rejection of the supplier from purchase process. Furnishing of data cannot be construed as automatic qualification for participation in the tender. Questionnaire should be signed by a responsible and authorized person of the Company / Agency.

S. No	Description	Supplier Response		
1.	Type of the Business (Proprietary/Pvt. Ltd/Public Ltd/etc.)			
2.	Name of the company/firm			
3.	Registration			
4.	Year of Inception			
5.	Registered address			
6.	Name & Address of the company			
7.	Contact person for this tender with name & address, email and contact number			
8.	Locations of the Branches (if any)			
9.	Current Annual turn-over			
10.	The Profit & Loss Account details for the last 3 years which is duly audited and Submitted as part of the Annual Report.			
11.	In Rs. Lakhs only	For 3 Financial Years		
		2015-16	2016-17	2017-18
	Total assets :			
	Turnover :			
	Profit/Loss :			

12. Details of last seven years' experience of Tenderer in executing similar type of work which are completed may be provided as per Form -A

Note: In order to consider as valid experience, all the experience has to be supported with the completion certificate along with TDS certificate (as applicable) and purchase order copies.

13. Details of present works being executed by the Tenderer may be provided as per Form -B

Note: copy of purchase orders may be enclosed.

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FORM –‘A’

DETAILS OF SIMILAR NATURE OF ASSIGNMENT COMPLETED

SIMILAR NATURE OF COMPLETED WORKS		
Sl.No.	DESCRIPTION	DETAILS TO BE PROVIDED BY VENDOR
1	Name of work / Project and location	
2	Name & Address of Employer / Organization, Telephone No.of officer to whom reference may	
a.	be made	
b.	client	
c.	Description of the project.	
3	Total value of the work (Rs. in Lakhs)	
4	Details of the Work description	
5	Completion period as per the order	
6	Actual completion period	
7	Reasons of completion	
8	Completion certificate along with TDS certificate (as applicable) and purchase order copies	

Note :

- a) Each project to be submitted in a separate sheet
- b) Supporting documents such as purchase order copy, completion certificate from the clients is to be attached to consider as valid experience.

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FORM –'B'

DETAILS OF SIMILAR NATURE OF ASSIGNMENTS WORKS IN PROGRESS

SIMILAR NATURE OF WORKS IN PROGRESS		
Sl.No.	DESCRIPTION	DETAILS TO BE PROVIDED BY VENDOR
1	Name of work / Project and location	
2	Name & Address of Employer / Organization, Telephone No.of officer to whom reference may	
a.	be made	
b.	client	
c.	Description of the project.	
3	Total value of the work (Rs. in Lakhs)	
4	Details of the Work description	
5	Completion period as per the order	
6	% of work completed	
7	Purchase order copies	

Note :

- a) Each project to be submitted in a separate sheet
- b) Supporting documents such as purchase order copy is to be attached

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Annexure -I

NAME OF THE WORK : _____

NAME OF BIDDER : _____

EXCEPTIONS AND DEVIATIONS

In line with Proposal Document, Bidder may stipulate Exceptions and deviations to the Proposal conditions if considered unavoidable.

SL. NO	Reference in Specification		Dept. Specification	Offered Specification	DEVIATION
	PAGE NO	CLAUSE NO			

NOTE :

Only deviations are to be written in this FORM.

Any deviations taken by the Bidder to the stipulations of the Proposal document shall be brought out strictly as per this format and enclosed along with the bid.

Any deviations not brought out as per this Proforma (FORM) and written elsewhere in the Proposal document shall not be recognized and the same is treated as null and void.

Any willful attempt by the Bidders to camouflage the deviations by giving them in the covering letter or in any other documents that are enclosed may render the Bid itself non-responsive.

(SIGNATURE OF BIDDER)

TO BE SUBMITTED ALONGWITH TECHNICAL BID

Annexure -II

ACCEPTANCE OF TERMS AND CONDITIONS BY THE VENDOR

We hereby agree to all the terms and conditions as given in Tender Notice No.

_____ dated:_____ for Planning, Design, Fabrication,

Supply, Erection and Commissioning of Pre-Engineered Steel Building Including Civil, Electrical & AC

Works for Entrance Plaza at Visitors Complex, Sriharikota..

Company Seal

(Authorised Signatory of Company)

Place : _____

Date : _____

TO BE SUBMITTED ALONGWITH TECHNICAL BID**Annexure -III****CERTIFICATE TO BE FURNISHED BY THE VENDOR**

1. The equipment once delivered will be subjected to an inspection by the Department CLIP at the given consignee location. The specifications of the equipment will be in conformity with the details provided by the user and as per given specifications. **The date of completion of commissioning would be deemed to be date on which the warranty will commence.**
2. We shall provide onsite comprehensive warranty of 12 MONTHS from the date of commissioning.
3. We confirm that we abide by the delivery schedule as laid out in tender enquiry.
4. We certify that any cost incurred on additional items/systems/components /accessories required would be borne by us.

Company Seal**(Authorised Signatory of Company)**

Place : _____

Date : _____

TO BE SUBMITTED ALONGWITH TECHNICAL BID**Annexure -IV****CHECK LIST**

S.No	Description	Compliance
1.	Enclosed Demand Draft of Rs.525/- towards the Tender Document Purchase Value (Applicable in case tender document not bought from SDSC SHAR, Purchase &Stores division). (indicate the DD number _____ &Date:_____).	Yes / No
2.	The detailed scope of work and technical specifications are under stood and price was quoted accordingly.	Yes / No
3.	Demand Draft towards the EMD (indicate the DD number _____ &Date:_____).	Yes / No
4.	Validity of Offer is 3 months	Yes / No
5.	Supporting documents is attached for Minimum Evaluation Criteria	Yes / No
6.	Vendor Evaluation Format is attached	Yes / No
7.	GST to be indicated in % if not mentioned it shall be assumed that the price quoted are inclusive of taxes	Yes / No
8.	Delivery Schedule is acceptable	Yes / No
9.	Accepted the Department Payment Terms	Yes / No
10.	Warranty and services during warranty are acceptable	Yes / No
11.	10 % of the Order Value shall be submitted as Security Deposit for the performance of the contract, valid till acceptance of the system.	Yes / No
12.	10 % of the Order Value shall be submitted as Performance Bank Guarantee.	Yes / No
13.	Liquidated Damages clause acceptable	Yes / No
14.	Last three years audited financial results are enclosed	Yes / No
15.	Latest income tax certificate is enclosed	Yes / No
16.	Latest solvency certificate	Yes / No

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PART – II : PRICE PART OF THE BID FOR THE WORK
(TO BE SUBMITTED IN A SEPARATE SEALED COVER)

S.No	Description	Units	Qty	Cost in INR
1.	Design, Fabrication, Supply, Erection and Commissioning of ENTRANCE PLAZA as per the scope of the work and specifications mentioned in RFP.	LS	1	
	Applicable Taxes & Duties	%		
	Total			
Total amount in Words: Rupees				

Terms & Conditions:

- i) This envelope shall comprise one original plus three copies of "Schedule of Prices" duly filled in all respect. This envelope shall be sealed subscribing **"DO NOT OPEN"**. Any other terms and conditions given in this part shall not be considered and if insisted upon by the Bidder, bids are liable for rejection.
- j) Priced commercial bid shall contain schedule of prices duly filled in, signed and stamped. No deviations, terms and conditions, assumptions, conditions, discounts etc. shall be stipulated in price bid. Department will not take cognisance of any such statement and may at their discretion reject such bids. SDSC SHAR may open Part – I of the bid on the due date of opening subject to meeting the minimum evaluation criteria. Price Bids (Part-II) of technically and commercially acceptable offers shall be opened at a later date.
- k) Unit rate for each of the item shall be indicated separately. The rate quoted shall be on FOR DESTINATION BASIS i.e., FOR SDSC SHAR, Sriharikota basis. Even unloading of the material at our site shall be your responsibility. Thus transportation of material from your works to SDSC SHAR and unloading at our site shall be the responsibility of tenderers. Department will provide the required material handling equipment at free of cost based on then availability.
- l) If the offers submitted by the tenderers are silent on taxes, it will be presumed that quoted rates are inclusive of taxes & duties and no claim in this regard will be entertained later.
- m) Supplier has to consider entire bill of material required for erection and commissioning complex as per the approved drawings/schematics.
- n) SDSC SHAR reserves the right to reject any or all the Bids without assigning any reasons thereof.
- o) Total amount shall be spelled out in terms of figures and words also.
- p) Department reserves the right to reject any or all the Bids without assigning any reasons thereof.

Signature of Authorised Person with Seal

Annexure A

**TECHNICAL SPECIFICATION
FOR
ELECTRICAL INSTALLATION WORKS**

CONTENTS

SL.NO.	DESCRIPTION	Vendor Compliance
I	GENERAL	
II	TECHNICAL SPECIFICATION FOR L. T. SWITCH BOARDS	
III	TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARD	
IV	TECHNICAL SPECIFICATION FOR CROSS LINKED POLYETHYLENE (XLPE), PVC LT POWER AND CONTROL CABLES	
V	TECHNICAL SPECIFICATIONS FOR CABLE TRAYS	
VI	TECHNICAL SPECIFICATIONS FOR WIRING	
VII	TECHNICAL SPECIFICATION FOR LIGHTING LUMINAIRES	
VIII	TECHNICAL SPECIFICATION FOR EARTHING	
IX	TECHNICAL SPECIFICATION FOR INSTALLATION	
X	TECHNICAL SPECIFICATION FOR TESTING AND COMMISSIONING	
XI	TECHNICAL SPECIFICATION FOR UPS	

I. GENERAL

1.0 INTRODUCTION

This tender comprises of Technical requirements for complete electrification like LT Panels, Lighting, Raw Power and UPS Power Distribution, Light fittings, Cabling & Wiring, cable tray, earthing etc., required for the proposed ACCOMODATION BLOCK AT SDSC-SHAR.

2.0 ELECTRICAL SYSTEM DETAILS

Operating Voltage for Power - 415V, 3 Phases, 4 Wire
 Operating Voltage for Lighting - 230V, 1 Phase, AC

3.0 SCOPE OF WORK

The scope of work covered by this tender shall include Supply, Installation, Testing and Commissioning of the following:

The Scope of Work shall also include transportation of all material to site, unloading safe keeping, storage and leading to site for installation.

4.0 BRIEF DESCRIPTION OF SCOPE OF WORK

Design, supply, erection, testing and commissioning of the following:

1. LT – XLPE armoured cable and PVC armoured (FRLS) cable for Various Lighting, Raw power & UPS Power Switchboards, Power and Lighting Distribution Boards, Plug and sockets etc.
2. Lighting, Raw power & UPS Medium Voltage Panels.
3. Cable trays of various sizes with suitable fixing arrangement.
4. Supply & fixing of Light fittings with suitable fixing accessories.
5. Wiring in conduits/cables for various light fittings / plug points etc.
6. Earthing of all the sub-switch boards, distribution boards, Polycarbonate plugs and sockets, modular switches and sockets etc.
7. UPS for Emergency lighting, TV, FAPA system, network components.
8. The work shall comply with the provision in Indian Electricity Rules / National Building Code - 2016 and as per statutory requirements of Central Electrical Authority.
9. Providing various earth pits as per the department specifications.
10. Termination of cables for LT Panels, Distribution Boards and Equipments.
11. Providing raw power and UPS sockets for wall outlets and work station.

5.0 SPECIFIC INCLUSIONS

- Cable trays, bends, couplers, down rod supports, provision of Anchor fasteners, wherever required
- Epoxy painted steel angles and channel support for cable trays with proper earthing at equal intervals.
- Steel support channels and frames for panels / DBs.
- Auguring of Driven Earth Pipes.

- Excavation of pits for earth electrode, Construction of earth pits including masonry and covers.
- Provision of pipe sleeves for cables and earth bus
- Chipping, Breaking and making good the damaged portion of civil works
- Calibration & Testing of all protective relays, meters & other measuring and Protective devices and submitting test certificates.
- Co-operation / Co-ordination for testing and commissioning with other suppliers
- Obtain drawing approval from necessary authorities, arrange inspection and obtain certificate for entire installation.
- Submission of 6 (six) copies of As Built Drawings, Documents and maintenance manuals
- Epoxy / Zinc rich painting, wherever required
- Preparation of working drawings including all lighting, power and earthing layout, cable tray layout, concealed / surface conduit layout if any and all required drawings for CEA approval.
- Inspection charges for critical equipments if any

6.0 ALTERATION OF WORK

If during inspection by Electrical Inspector, any defects are pointed out either on equipment supplied by the contractor or on the workmanship, the Contractor shall replace / repair the equipment and redo the work as per Electrical Inspector's requirements without any extra cost.

7.0 STATUTORY REGULATION

Contractors License

The contractor shall hold valid electrical license issued by competent authority of Government for carrying out the work covered in this tender.

Special condition to the contractors:

Shop Drawings / Co-ordination Drawings

The Contractor shall arrange for detailed shop drawings / fabrication drawings and material specifications for specialized works including detailed design calculation and submit required copies each of the same for the department approval. All shop drawings shall reflect the design intent as provided in the execution drawings and shall not be deviated without prior permission. The shop drawings shall be based on the actual site conditions and shall take into account all coordination as may be required in order to avoid any clash or interference with other service lines or any other building features. The shop drawings shall be fully supported by necessary design calculations wherever applicable or as directed by the department to the Contractors. Such design calculations shall be carried out by a competent agency and shall also comply with relevant Indian / International standards as applicable. Wherever so required, the department reserves the right to demand a certificate as to the correctness of the design to be issued after verification by an independent proof checking agency that the department may either approve or nominate.

All charges for preparing the shop drawings, coordination drawings, preparation of design, getting the same proof checked including carrying out any other modifications as necessary shall be fully covered in the quoted rates and no extra shall be payable for adherence of the above requirement.

And executed drawing/completion drawing on completion of respective work. The final version thereof submitted in hard copy format in triplicate as well as electronic format as acceptable by department.

II. TECHNICAL SPECIFICATION FOR LT PANEL BOARDS

1.0 SCOPE:

This specification covers the technical requirements of design, manufacture, test, supply of 415V L.T Panel Boards complete with all accessories for efficient and trouble free operation for Totally Type tested (TTA).

2.0 STANDARDS:

The equipment covered by this specification shall, unless otherwise stated, be designed, constructed and tested in accordance with the latest revisions of relevant Indian Standards and shall conform to the regulations of local statutory Authorities.

IS-722	A.C. electricity meters
IS -732	Code of practice for Electrical wiring installation.
IS -375	marking and arrangement for switchgear busbar main connections and auxiliary wiring.
IS -1248	Direct acting electrical indicating instruments.
IS -13947	LV Switchgear and Control Gear.
IS -2705	Current Transformers.
IS -3231	Electrical relays for power system protection.
IS -8623/13947	Specifications for factory Built assemblies for Voltages upto 1000V A.C. and 1200V D.C.

The panel supplied shall satisfy all the requirements of Central Electricity Authority and modification if any required at site shall be carried out by the contractor at his own cost.

3.0 CONSTRUCTION:

The panel shall be metal-enclosed, free-standing compartmentalised, modular type suitable for indoor installation. The panel shall be dust and vermin proof and the enclosure shall provide a degree of protection of not less than IP-52. The panels height shall be of uniform and restricted to 2100mm, however not exceeding 2300 mm or as directed by department.

The panel shall be fabricated out of adequate thickness mild steel structural sections. The frames shall be enclosed with steel of not less than 2.0 mm thickness

The panel shall be extensible on either side by the addition of a module. It shall be possible to extend the switch board irrespective of the type of end panel.

Each of the outgoing feeders in the panel board, terminal are brought out to the cable chamber to form convenient connection of the outgoing cables.

Incomers and outgoing feeders shall be provided with their own separate modules having separate doors, isolating switch of each units shall be mechanically interlocked with its respective doors.

Each cable chamber shall have cable entry from bottom / Top and removable gland plates shall be provided for this purpose. The cable chamber shall be provided with suitable supporting arrangement between the gland plate and terminals, in the middle. The cable chamber shall have a minimum width of 300 mm depending upon the outgoing cables.

All retaining catches, screws and bolts for doors and covers shall be cadmium plated. Screws and bolts shall be captive. All covers, doors and joints shall be gasketed.

Equipment to be mounted outside cubicles shall be flush mounted on cubicle door. No externally mounted equipment shall be mounted above 1.8m or below 0.3m above floor level. The panel shall be fabricated in suitable transport sections and assembled on rolled steel channel box frame.

The panel board shall be made from CRCA sheet steel 14/16 SWG thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet shall be seam welded, all welding slag grounded off and welding pit wiped smooth with plumber metal. All panels and covers shall be properly fitted and square with the frames and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with shrunk nuts. Self-threading screws shall not be used in the construction of switchboards. The board shall be of totally enclosed design, completely dust tight and vermin proof. Gaskets between all adjacent and beneath all covers shall be used to render the joint effectively dust tight. Soft compressible gasket shall be used between all metal joints, doors and covers to prevent ingress of dust.

All similar materials and removable parts of the switchboard shall be interchangeable. The panel boards shall be filled with the same family of switches for various ratings with a view to ensure uniformity of design, maintenance and replacements. A horizontal wire way with screwed cover shall be provided at the top/bottom to take inter-connecting control wiring between different vertical sections. Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contractors and control fuses etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker busbar connections.

4.0 BUSBARS:

The busbars shall be air insulated and made up of high conductivity, electrolytic Aluminium.

It shall have a fault withstand capacity of 50 KA / 1 Sec. All busbars shall be fully screened by means of PVC sleeves in their own compartment running throughout the length of the panel and also suitable allowance shall be made for bus expansion. Suitable segregation shall be provided in between busbar chamber and adjoining compartments.

The busbars shall be TP and N, the section of the neutral bus shall be 50%, 100% and 200% size of the phase busbar as referred / specified in the BOQ

The busbar shall be PVC sleeved with colour strips of red, yellow, blue and black and the same shall be arranged in accordance with IS-375.

The busbar shall be properly segregated, suitably braced with insulated supports (DMC/FRP/SMC) placed at appropriate intervals to withstand the electro magnetic stresses during short circuit. Minimum electrical clearances shall be maintained between phase, neutral and body as per standards.

Phase to Phase clearance	-	25mm
Phase to Neutral clearance	-	25mm
Phase to Earth clearance	-	25mm
Neutral to Earth clearance	-	19mm

5.0 INTERCONNECTION:

The interconnections of all the phases between the busbars and the incoming side of the switch control shall be inaccessible when the doors of the controls are opened for removal of fuses etc.

For each and every tapping from the busbars, separate connections shall be made.

No direct tappings from the busbar shall be made for any feeder without control and protection.

The incoming and outgoing cable shall be properly identified and also the circuit to which it is connected on each outlet.

6.0 AIR CIRCUIT BREAKERS:

ACB shall be Four pole should comply with the requirements of relevant IS with latest amendments and shall have provision for SCADA compatibility.

a) ACB shall be motor operated spring charged motor operation. ACB shall be draw out type. Necessary interlocks shall be provided in Service/Test/isolated position. Indications both in Breaker and on the feeders shall be provided for the following.

- i) service
- ii) test
- ii) isolated
- iv) ON/CLOSED
- v) OFF/OPEN
- vi) Spring charged

b) ACB shall have built in protection against over load, short circuit and earth fault. Necessary protective releases shall be provided in the ACB.

c) ACB shall have provision for remote operation to close the breaker or to open the breaker.

- d) ACB shall be settable over load, short circuit and earth fault current provision.
- e) ACB shall have Front Test kit for checking the relay settings with Secondary Injection Test Kit
- f) Necessary wiring required for connecting external remote 'On' and 'OFF' controls for ACB shall be provided with required wiring from ACB compartments up to metering compartment and identified separately.
- g) ACB shall have Micro Processor Release having IDMT non-directional shunt trip characteristic for over load and short circuit protection with suitable CTs. Protection shall also be available against earth fault and instantaneous short circuit. All the protection settings (O/L, S/C & E/F) shall be field adjustable as per requirement.
- h) ACB shall be 4 Pole version as per Schedule of Quantities with fully draw out type mounted on telescopic rails and electrically operated having minimum of 6NO + 6NC spare auxiliary contacts apart from the contacts used for breaker operation/annunciation.
- i) The ACB shall be suitable for tripping / closing operations with 230V AC supply. The spring charge motor shall be suitable for 230 V AC operation.
- j) The minimum ultimate short circuit breaking capacity (at 415V, AC) of ACB shall be 65 kA and rated making capacity shall be minimum 150kA.
- k) ACB shall be electrically operated (motorised) type.
- l) ACB shall have position locking feature, lockable trip push button, and shutter assembly to prevent access to live terminals.
- m) ACBs shall conform to IS /IEC 60947- 2, IS 13118.

7.0 MOULDED CASE CIRCUIT BREAKERS:

- The MCCB upto 630A shall be current limiting category A and 800A and shall comply with the requirement of IEC 60947-2 / IS13947-2: test sequence I, II, III. MCCBs shall have Class II Front Facia.
- Should be suitable for isolation as per standard.
- Shall have Thermal Magnetic release upto 250A
- Micro processor / electronic releases should be EMC compatibility, thermal memory and true rms sensing
- The breaking capacity shall be Icu values as per the Schedule of Quantities.

- Should have the facility to change the protection setting in on condition.
- Shall have the Isolation between power circuit and Control circuit.
- Shall have with front operated door handles
- MCCB shall have minimum 15000 cycles electrical life upto 160A
- The MCCB shall comprise of switching mechanism, contact system, arc extinguishing device and the tripping unit all mounted inside a moulded case. The MCCB shall be provided with field settable over load protection and S/C protection.

MCCB shall employ quick make and quick break switching mechanism independent of the speed of operation of the operating handle. The operating mechanism also is trip free. The operating handle shall indicate the position of the MCCB in ON / OFF / TRIP. The operating handle shall have provision for padlocking. Door interlocking shall be provided in the drawing and specification.

MCCBs shall be rated as specified in the BOQ.

1. MCCBs should be electrically and mechanically interlocked wherever specified in the BOQ.
2. Electrical interlock should be done with appropriate control logic.
3. Mechanical interlock should be done with MCCB has to be fitted in the mechanical frame with interlock lever.
4. Frame should be fitted in either direction (vertical or horizontal)

8.0 CONTACTORS:

Contactor shall be of electromagnetic type rated for uninterrupted duty as defined in IS-13947-4-1 unless otherwise specified and also suitable for capacitor duty.

The main contacts shall be of silver or silver alloy.

The insulation class for the coil shall be class E or better.

Each contactor shall be provided with 2 N/O and N/C aux. contacts.

Contactor coil rating shall be minimum pick up of 85% of rated voltage and minimum drop out of 75% rated voltage.

9.0 PUSH BUTTONS:

Push buttons shall be generally shrouded. Each push button shall be provided with 1 N/O and 1 N/C aux. contacts. "Stop" push button shall have, 'stay-put' feature. Colour code shall be as per IS-6875.

10.0 INDICATION LAMPS:

- 10.1 Indication lamps shall be provided in each feeder with indicate ON, OFF & Trip.

10.2 Potential free contact shall be provided for monitory ON, OFF and Trip status in all feeders for automations and all circuits shall be brought to common terminal block in the panel for interfacing with IBMS.

10.3 Fire alarm trip contacts and lamp, hooter with test button circuit shall be provided in the incomers

11.0 CONTROL TRANSFORMER:

Control transformer shall be double wound, dry type and shall have good regulation (5% or less) to cope with inrush current of contactor coils with sufficient rating of HRC fuses for primary and secondary.

12.0 SPACE HEATERS:

Anticondensation space heaters, with thermostat suitable for 230V, 1 Ph supply along with a switch / fuse shall be provided in each panel.

13.0 CONTROL SWITCHES:

A general purpose control switch shall be provided for selection of "Auto" & "Manual". The switch shall be provided with engraving plate in the front with "Auto", Manual" & "Off" inscription. This switch shall be normally of the fixed-control bar type heavy duty unit.

14.0 MEASURING INSTRUMENTS:

Ammeters and Voltmeters shall be of digital type. They shall be industrial grade and shall have means of zero adjustment from the front without dismantling them. They shall be capable of carrying the normal full load current (via CTS) and shall not be damaged by effects of rated fault current. The instruments shall have an accuracy class of 1.0 as per IS - 1248. Multifunction Meters shall be SCADA compatible with RS 485 / Ethernet Port for MODBUS / PROFIBUS communication. However the department deserves the right to approve the make and model of the meters considered.

15.0 CONTROL WIRING:

Panel shall be supplied with all internal wiring comprising of PVC FRLS insulated 1.1 KV grade, multistranded flexible copper conductor of 2.5 Sq.mm cross section for Control Circuits and 1.5 Sq.mm cross section for Power Circuits.

Wiring associated with a particular phase shall be the colour of that phase viz. Red / Yellow, or Blue, wiring associated with earthing shall be with green colour insulation and for neutral it shall be with black colour insulation.

Wiring shall be neatly laid and run on insulated cleats of limited compression type insulated straps.

All cables shall have crimped terminations and shall be identified by means of glossy plastic ferrules at both ends, showing the wire number as indicated in the schematic diagrams. The ferrules shall be indelibly marked.

Wiring to items mounted on hinged doors or wiring that is subject to movement, shall run in helical binding. The binding shall be securely anchored at both ends and sufficient slack provided to prevent any strain being imposed on wiring.

16.0 EARTHING:

All the metal parts of all equipment supplied within the panel (including doors and gland plates)

other than those forming part of all electric circuit, shall be connected by means of two independent

earth conductors to continuous copper/G.I earth bar running along the full length of the panel. The panel shall be provided with two brass and GI earthing stud terminals, with suitable nuts, washers etc. for connection to ground bus.

17.0 TERMINAL BLOCK:

Terminal blocks shall preferably be grouped according to circuit functions and each terminal block group shall have at least 10% spare terminals. Terminal blocks for control circuit shall be of 650V grade with contact ratings not less than 10A and stud/clamp type.

Not more than two wires shall be connected to any terminal block.

18.0 LABELS:

Labels shall be provided to describe the duty of or otherwise identify every Instrument, or other item of equipment mounted internally and externally. Switch positions shall be fully identified. Wording shall be clear, concise and unambiguous.

Each label shall be permanently secured to the panel surface below the item to which it refers.

The labels shall be engraved plastic (4 mm thick) with white letters in black background or with appropriate metal engraving.

In addition to component labels, each cubicle door shall bear a large identification labels and the panel shall include large, prominent overall identification label.

19.0 PAINTING:

Care shall be taken in workmanship and selection of materials to prevent the occurrence of any form of damage or corrosion due to damp or highly humidity conditions.

The panel shall be prepared, primed, filled and painted to the highest standards.

All items shall be cleaned and deburred after fabrication and welding is complete. External surfaces shall be filled and rubbed down as necessary to obtain a perfectly flat smooth surface free from blemishes and imperfections and the whole shall be Powder Coated with Epoxy paint and the shade shall be indicated later.

The panels shall be fabricated at such work shops where the following facilities are available.

- a) Sand blasting
- b) Pre-treatment (Minimum Seven tank process)
- c) Spray booth
- d) Heating oven for all sizes of panels.
- e) Heat shrinking of PVC sleeves.

20.0 TESTS:

The panel shall be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure accuracy of wiring, correctness of control scheme and proper functioning of all equipment.

20.1 Type Tests:

The Bidder shall furnish the (2) sets of type test certificates for all the tests, conducted on similar panel.

- 1. Short time current test.
- 2. Temperature rise test
- 3. One minute power frequency voltage withstand test.

20.2 Routine Tests: (To be witnessed by Client / Architect)

- 1. Mechanical operation test
- 2. Dielectric tests
- 3. Functional/Wiring test

21.0 DRAWINGS AND DOCUMENTS:

The following drawings and documents shall be furnished by the department authorized panel builders for approval from Department.

- a. General Arrangement drawing of the panel showing.
 - i. Overall Dimensions
 - ii. Terminal locations
 - iii. Total weight
 - iv. Foundation details
 - v. Sectional view
 - vi. Bill of materials
- b. Single line diagram and wiring diagram.
- c. Technical details for ACBs, Switchgear, lamps, meters etc.
- d. Manufacturing schedule and test schedule.
- e. Calculation for sizing of busbars.
- a. Quality Plan
- b. O & M manual

The bidder shall furnish a tentative drawing showing the overall dimensions of the panel, along with the bid.

22.0 TOOLS AND TACKLES:

All tools/ tackles like breaker pullers, interlock keys required for the repairs or maintenance of panel shall be recommended and supplied along with the panel without extra cost.

23.0 SPARES:

A list of recommended spares shall be indicated and the price is quoted separately.

III. TECHNICAL SPECIFICATION FOR DISTRIBUTION BOARDS

1.0 SCOPE:

This specification covers the design, manufacture, assembly, testing at works and supply of Distribution Boards. Complete with all accessories for efficient and trouble free operation.

2.0 CONSTRUCTION:

The distribution boards shall be fabricated out of 1.6mm thick sheet steel and shall be totally enclosed, dust and vermin proof, dead front, with hinged door type of bolted / welded construction suitable for wall mounting.

Each DB shall have individual hinged/bolted gasketed doors with can lock. Removable conduit entry plates shall be provided at top and bottom of the DB to facilitate drilling the conduit holes at site to suit individual requirements or knockout shall be provided.

Protective insulated cover plate shall be provided inside the panel to shroud all the live parts. Only the operating handle of the switch and the operating knobs of the miniature circuit breakers shall be projecting outside the cover plate. The unused outgoing gaps of DB shall be suitably blanked with PVC plate at no extra cost. The incoming switch terminals should be suitably shrouded to avoid accidental contact. Each phase or way shall also be suitably shrouded with DMC/SMC/FRP. The boards shall be factory wired and assembled. Circuit identification cables shall be provided on the cover.

All Lighting/Power/UPS Distribution Boards shall be provided with Double Door arrangements with Phase segregation Type.

All components in the Distribution boards shall be same make.

3.0 BUSBARS:

The busbars shall be air insulated and made of high conductivity high strength Electrolytic copper busbars liberally sized with high safety factor for the required rating (both short circuit and continuous currents). The neutral busbar shall have adequate number of terminals for all outgoing single phase circuits. A copper earth bus of suitable size shall be provided in each DB for earthing of the power, lighting circuits and earthing of DB.

4.0 MINIATURE CIRCUIT BREAKERS:

The Miniature Circuit Breakers (MCBs) shall be heat resistant, moulded type, designed, manufactured and tested as per IS 8828. The MCBs shall have inverse-time tripping characteristic against over loads and instantaneous trip against short circuits. The MCBs shall be of fault current limiting type also. The MCBs shall be slip on type to the busbar. The ON and OFF machines of the switch handle shall be clearly marked. The MCBs shall be suitable for operating in ambient of 45 degC without derating. The incoming and outgoing of the MCBs shall be accessible only after opening the front door of the DB. The MCBs shall be suitable for 415V, 3 phases, 4 wires, 50 Hz system with the fault level of 10 KA RMS symmetrical. The

terminals of MCBs shall be suitable for use with eye lugs. The 4 pole, 3 pole and 2 pole MCB knobs shall be trunked with adequate strength tandem pin.

The MCB value of the instantaneous tripping current, they are categorised into 3 types, namely, B,C and D. Type B is for resistive or slightly inductive loads such as heating and lighting, Type C for Inductive loads such as motors or transformers and Type D for loads such as UPS, VFDs and high discharge illumination.

5.0 EARTH LEAKAGE CIRCUIT BREAKERS:

Incomer of the DB shall be provided with current operated Earth leakage circuit breakers with a sensitivity of 30mA/100mA/300mA as specified in the BOQ. The ELCB shall have Trip free mechanism and shall operate even on neutral failure.

The ELCB shall be provided with a Test Push Button to stimulate leakage and test the ELCB. The ELCB shall operate and switch off the circuit within milliseconds in case of a fault.

The enclosures of the ELCB shall be moulded from High quality insulating materials, which shall be fire retardant, anti-tracking, non-hygroscopic, and impact resistant and shall withstand high temperatures.

ELCB (HI/SI/Hpi Version) if used for UPS application shall have enhanced high immunity against transient current and voltage and hence reduce unwanted tripping of the circuit in environments with disturbances and defects faults with DC components

6.0 GROUNDING:

The DBs shall be provided with two Nos brass earthing stud terminals with suitable nuts, washers etc for connection to earth bus outside the DB.

7.0 PAINTING:

Care shall be taken in workmanship and selection of materials to prevent the occurrence of any form of damage or corrosion due to damp or highly humid conditions.

The DB shall be prepared, primed, filled and painted to the highest standards.

All items shall be cleaned and deburred after fabrication and welding is complete.

External surfaces shall be filled and rubbed down as necessary to obtain a perfectly flat smooth surface free from blemishes and imperfections and the whole shall be powder coated with epoxy paint and the shade shall be indicated later.

8.0 TEST:

All necessary routine tests shall be performed on the equipment to demonstrate satisfactory performance to owner / consultant at works without any extra cost. Equipment shall not be despatched without obtaining approval of test certificates for type, routine and acceptance tests.

9.0 DRAWINGS AND INSTRUCTION MANUALS:

Along with the offer, the bidder shall submit the following documents, in Triplicate.

- a. General arrangement of DB
- b. Technical leaflets on DB, MCB, isolator etc.
- c. Type test reports as per IS 8828
- d. Tripping characteristic curves for MCB.

After award of the order, the contractor shall submit the following documents for approval, in six copies.

- a. General arrangement drawing showing the constructional features, dimensions, installation details etc.
- b. Complete technical particulars of Distribution boards, miniature circuit breakers, isolators etc.
- c. Tripping characteristic curves for MCB.

Before taking up manufacturing of the equipment the Bidder shall have to take the approval of for design and drawing. Any manufacturing done prior to approval shall be rectified by the bidder at his own cost and the equipment shall also be supplied within the stipulated period.

**IV. TECHNICAL SPECIFICATION FOR CROSS LINKED POLYETHYLENE [XLPE],
PVC POWER AND CONTROL CABLES**

1.0 SCOPE:

This specification covers the design, manufacture, testing at works, inspection and delivery at site of XLPE insulated and PVC power and Control cables.

2.0 STANDARDS:

The cables covered by this specification shall, unless otherwise stated, be designed manufactured and tested in accordance with the latest revisions of relevant Indian standards.

IS-694	:	PVC insulated cables for working voltages upto and including 1100 volts.
IS-1554	:	PVC insulated heavy duty cables for working voltages upto and including 1100 volts.
IS-3961	:	Recommended current ratings for PVC insulating and PVC sheathed heavy-duty cables.
IS-8130	:	Conductors for insulated electric cables and flexible cords.
IS-5831	:	PVC insulation and sheath of Electric cables.
IS-3975	:	Mild steel wires, strips and tapes for armouring of cables.
IS-7098	:	Cross linked polyethylene insulated PVC sheathed cables.
IS-6130	:	Conductors for insulated electric cables and flexible cords

3.0 CONDUCTOR:

The conductor shall be Copper / aluminium as specified in the Schedule of Quantities. It shall be smooth, uniform in quality and free from scale and other defects. The stranded conductor shall be clean and reasonably uniform in size and shape. The conductor shall be either circular or shaped.

4.0 CONDUCTOR SHIELD:

Conductor shield shall be extruded in the same operation as the insulation. The semi-conductor polymer shall be cross linked.

5.0 INSULATION:

- a) Insulation shall be cross linked polyethylene and it shall preferably be dry-cured for XLPE cable
- b) Insulation shall be PVC for PVC cable as specified in the Schedule of quantities.

5.1 OUTER SHEATH:

All cables specified in the Schedule of Quantities shall have Extruded PVC Type-2 Outer sheath with Fire retardant low smoke PVC (FRLS) to reduce the Fire hazard.

- c. Oxygen Index - 29 when tested at 27 + 2°C.

- d. Temperature Index - Minimum 250°C at Oxygen Index 21.
- e. Flammability - As per IS 10810 Part 53 – 61 & 62.
- f. Smoke Generator - Smoke density rating shall not be More than 60%.
- g. Acid gas generation - Less than 20% by weight.

6.0 INSULATION SHIELD:

This shall preferably be of the strippable, triple-extruded thermoset type.

7.0 ARMOUR:

The armour may be of galvanised steel wires or galvanised steel strips

8.0 SERVING:

The cable serving shall protect the cable sheath and armour from electrolysis caused by stray currents, and from galvanic action. It shall also protect the cable from mechanical damage and corrosion.

9.0 GENERAL:

The cable shall withstand all mechanical and thermal stresses under steady state and transient operating conditions.

10.0 TEMPERATURE RISE:

The maximum conductor temperature shall not exceed 90 degree C during continuous operation at full rated current. The temperature after short circuit for 1.0 second shall not exceed 250 degree C with initial conductor temperature of 90 degree C.

Bidder shall give the following information in the Bid for each conductor cross section specified.

- a. Rated continuous current
- b. Rated 1.0 second short circuit / short time current

Rating factor shall be given by the Bidder for the following:

- a. Variation in ground temperature
- b. Variation in soil thermal resistivity
- c. Variation of Ambient Temperature
- d. For the cables laid side by side, at ID spacing and in Tier formation.

The Bidder shall also indicate the percentage overload that the cable can carry and its duration.

11.0 CABLE DRUMS:

Cables shall be supplied in non-returnable drums of sturdy construction. All ferrous and other metal parts of drum shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage. Type of dust preventive finish and coating adopted may be mentioned.

The length of cable on each drum shall be as **advised by department** considering to reduce number of joints and also easy handling.

12.0 TESTS:

12.1 Routine Tests: (To be performed on each drum length)

All tests as per relevant IS shall be conducted and shall be witnessed by the Client.

12.2 Type Tests:

The Bidder shall furnish two (2) copies of type test certificates conducted on similar cables along with the Bid.

- a. Partial discharge test
- b. Bending test followed by partial discharge test
- c. Dielectric power factor as function of voltage
- d. Dielectric power factor as function of temperature
- e. Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests.
- f. Impulse withstand test
- g. High voltage test.

13.0 SPECIFICATION FOR PVC ARMoured CABLE:

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard codes of practice.

13.1 Cables:

All cables shall be 1100 Volt grade PVC insulated, sheathed with or without steel armouring as specified and with an outer PVC protective sheath. Cables shall have high conductivity stranded aluminium or copper conductors and cores shall be colour coded to the Indian Standards.

All cables shall be new without any kinds or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on the surface of the cable at every 600 mm centres as per Indian Standard.

14.0 INSTALLATION:

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the department before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown on the schedule of work shall be regarded as a guide.

Cables rising indoors shall be laid on walls, ceiling, inside shafts, or trenches. Single cables laid shall be fixed directly to walls or ceiling. All supports shall be at not more than 500 mm. Where numbers of cables are run, necessary cable trays shall be provided wherever shown. Aluminium identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the cable manufacturer recommendations whichever is higher.

In case of direct buried cables, the cable route shall be parallel or perpendicular to roadways, walls, etc., Cables shall be laid in an excavated, graded trench, over a sand cushion to provide protection against abrasion and as per the department specifications. The dimension of excavated trenches shall be as per drawings. Backfill over the cables shall be sifted earth 90% compacted cables shall be buried with a minimum earth cover of 600 mm. The cables shall be provided with cable markers at every 20 metres.

All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end terminations indicating the feeder number and the Panel / Distribution Board from where it is being laid. All cable terminations for conductors' upto 4 sq.mm may be insertion type and all higher sizes shall have tinned copper compression lugs. Cables terminations shall have necessary brass glands. The end-terminations shall be insulated with a minimum of six- half-lapped layers of PVC tape. Cable armouring shall be earthed at both ends.

15.0 TESTING:

MV cables shall be tested as per IS upon installation including testing Insulation Resistance Values with a 500 V Insulation Tester and the following readings established.

- [illegible]

All test readings shall be recorded in the separate book and the same to be handed over to the department.

SPECIFICATION FOR CABLE LAYING/ROUTING:

1. GENERAL:

the contractor shall mark it out on the drawings as per the actual and also on the site and obtain the approval of the Engineer-in-charge before laying the cable.

All cables shall be clamped properly when laid along the wall /ceiling /cable tray. Cables laid in built-up trenches shall be on steel supports. Aluminium identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the manufacturer's recommendations whichever is higher.

Cables shall be identified at end terminations indicating the feeder number and size and no. of runs and the Panel / Distribution Board from where it is being laid.

All cable terminations for conductors' upto 4 sq.mm may be insertion type and all higher sizes shall have compression lugs.

Cable terminations shall have necessary brass glands.

Wherever cables pass through floor or through wall openings, it shall be taken through HDPE PVC/GI sleeves. The open ends of the sleeves shall be sealed by cold setting compound after cables are pulled through them to prevent entry of vermin and ingress of water.

In making connection on switches and other terminals no strand of conductor shall be cut to facilitate termination.

Cable armouring shall be earthed at both ends

The cable shall be as per the relevant IS amended from time to time, Test certificate should be submitted by the contractor for the cables supplied by him.

The contractor at his own cost and risk shall arrange all necessary tools & plants. The contractor will be held responsible for any damage to the building or equipment at the time execution of work.

V. TECHNICAL SPECIFICATION FOR CABLE TRAY

General Requirement:-

Cable Tray and Cable Ladder systems are intended for the support and accommodation of cables and possibly other Electrical equipment in Electrical/Instrumentation/Communication systems.

Design and Fabrication of Cable Trays

HOT DIPP GALVANIZED(GC) CARBON STEEL WIRE MESH CABLE TRAYS AS PER EN-ISO-1461

Supply and erection of HOT DIPP GALVANIZED(GC) AS PER ENISO- 1461, CARBON STEEL WIRE MESH CABLE TRAYS including supply and fixing of tray supports with following internal dimensions. The Tray sizes, Area of the of the Tray and dia of the wire should be Equal or more than the specified. The Load bearing capacity of the Cable Trays should be minimum as specified. The Cable trays to be manufactured with a longitudinal 'T- welded' safety edge along the top wire of the sidewall by using side action bolt croppers (cutters), and fastened using 25mm and 30mm counter clamps with M6 nuts and bolts. The trays are jointed by using Faslocks at all bends. All surfaces are treated as the tray. Cable Trays shall be coupled together by using EDRN fast spring clip coupler or a 25mm/30mm counter clamp combination with supporting lateral splice plate on tray over 300mm width. Without Couplers, the installation will not be accepted. The coupling must have the same surface finish as the tray. All the cable trays to be earthed by running a cable and fixed by 1 Grife Quip per every 15Mt Length of cable trays. The cables to be dropped by using Cable Exits / Droppers(DEV100). The cutting of Cable Trays to be done by using COUPFILGM Cutter. The deflection characteristics of the tray must be tested . Electrical continuity across a coupling must be demonstrated by means of published test methods and results as per IEC - 61537.

UPVC CABEL MANAGMENTY SYSTEM

UPVC Cable management system consisting of snap-fit lids 2 / 3Nos of cable dividers and allied accessories such as internal tees, flat tees and shall have provision to accept the mounting boxes that snap fit into the profile.

VI. TECHNICAL SPECIFICATION FOR WIRING

1.0 SCOPE

This specification covers the standards of internal wiring.

2.0 INTERNAL WIRING

System of Wiring

The system of wiring shall consist of FRLS PVC insulated copper conductor wires in MS / PVC conduits and shall be concealed or surface mounted as called for.

3.0 GENERAL

Prior to laying and fixing of conduits, the Contractor shall carefully examine the working drawings prepared by him and approved by the department, indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of the department. Any modifications suggested by the contractor shall be got approved before the actual laying of conduits is commenced.

In laying of conduits it is important that not more than two right angle bends are provided for each circuit and as far as possible, No junction box shall be provided in the entire length of conduit run for drawing of wires. Only switch outlets, lighting fixture outlets, equipment power outlets and socket outlets shall be considered for drawing of wires.

4.0 CONDUITS

Conduits and Accessories shall conform to relevant Indian Standards. Joints between conduits and accessories shall be securely made.

Only approved make of conduits and accessories shall be used.

Conduits shall be delivered to the site of construction in original bundles and each length of conduit shall bear the label of the manufacturer.

Maximum permissible number of 1100 volt grade FRLS PVC insulated wires that may be drawn into rigid non metallic or MS / GI Conduits are given below :

Size of wires Nominal Cross section Area (Sq. mm.)	Maximum number of wires within conduit size(mm)				
	20	25	32	40	50
1.5	5	10	14	--	--
2.5	5	8	12	--	--
4	3	7	10	--	--
6	2	5	8	--	--

10	--	3	5	6	--
16	--	2	3	--	6
25	--	--	2	4	6
35	--	--	--	3	5

5.0 BENDS IN CONDUIT

Where necessary, bends or diversions may be achieved by means of bends and / or circular inspection boxes with adequate and suitable inlet and outlet joints. In case of recessed system each junction box shall be provided with a cover properly secured and flush with the finished wall surface. No bends shall have radius less than 4.5 cms or three times the outside diameter of the conduits.

6.0 FIXING OF CONDUITS

All conduits shall be installed so as to avoid steam and hot water pipes. After the conduits, junction boxes, outlet boxes and switch boxes are installed in position, their outlets shall be properly plugged or covered so that water, mortar, insects or another foreign matter does not enter into the conduit system.

Recessed conduiting shall be done by making chase in the masonry by chase cutter, the conduit shall be fixed in the chase by means of GI hooks not more than 600 mm apart. After fixing of conduit the chase shall be filled with cement mortar after fixing of chicken mesh and brought to the original finish level of the surface.

7.0 SWITCH OUTLETS AND JUNCTION BOXES

All outlet boxes for switches, sockets and other receptacles shall be rust proof and shall be of 2 mm thick mild steel sheets with HOT dipped galvanizing (or as specified in BOQ), having smooth external and internal surfaces to true finish. All outlet boxes for receiving plug sockets and switches shall be fabricated to approved sizes. All boxes shall have adequate number of knock out holes of required diameter and earthing terminal screws. Outlet boxes shall be of a minimum depth of 65 mm.

Surface Finish & Colour of the switch, socket and plates should be white or colour as per client preference. Surface finish of switches sockets and cover plates must be satin finish for a scratch less look. It should neither be in glossy nor in matte finish. Material The material for the components should be high impact – resistant polycarbonate or poly carbonate plus ABS for better finish and life. Installation Switch and socket modules can be snap fitted to and removed from the grid plate without unscrewing the grid plate from the wall box. Switches 6A & 16A, one-way or two-way, 250V, modular switches rated for fluorescent loads, conforming to IS:3854/2005. The material for the components should be high impact – resistant Polycarbonate. 6A and 16A switches must have in line centre terminals for ease of wiring. Terminals of switches should be IP 20 protected Sockets 6A and 16A sockets should confirm to IS:1293 and should be in two module size. The sockets should be child proof with shutters.

The shutters must be designed in such a way that it must prevent insertion of single pin to line and neutral terminals. 6A socket must be with 3PIN (Phase, Neutral and Earth) and must allow insertion of two pin plugs also without disturbing earth pin while ensuring child protection by not allowing single pin insertion. Voice and data sockets TV, telephone and data sockets must be available in one module size. Data socket must be of cat6 type. Gridplates & Surrounds Material of surrounds must be PC and ABS combination to ensure smooth satin finish and life. Cover and grid plates must have a separator/bridge for every two module window. Logo of brand should be embossed on the surface of the cover frames. Grid plates and surrounds to be available in 1M, 2M, 3M, 4M, 6M, 8M, 12M and 18M sizes. The finish / shade of cover plates shall be as approved by department.

8.0 INSPECTION BOXES

50 mm dia inspection boxes of cast iron shall have smooth external and internal finish to facilitate removal and replacement of wires, where required.

9.0 CONDUCTORS

All FRLS PVC insulated copper conductor wires shall conform in all respects to Indian Standards.

10.0 BUNCHING OF WIRES

Wires carrying current shall be so bunched that the outgoing and return wires are drawn into the same conduit. For lighting wires originating from two different phases shall not run in the same conduit. All wires shall have ferrules for identification. Lighting and power circuits shall be separate.

11.0 DRAWING CONDUCTORS

The drawing and jointing of FRLS PVC insulated copper conductor wires shall be executed with due regard to the following precautions. While drawing wires through conduits, care shall be taken to avoid scratches and kinks which may cause breakage of conductors. There shall be no sharp bends. Wire reel stands to be used for pulling of wires to avoid kinks.

Insulation shall be removed by insulation stripper only. Strands of wires shall not be cut for connecting terminals. The terminals shall have sufficient cross sectional area to take all strands and connecting brass screws shall have flats ends. All looped joints shall be connected through terminal block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. All light points shall be terminated through a connector.

All light points will terminated through a connector. Conductors having nominal cross sectional areas exceeding 10 sq.mm shall always be provided with cable sockets. At all bolted terminals brass flat washer of large area and approved steel spring washer shall be used. Brass nuts and bolts shall be used for all connections.

Only licensed wiremen (Before doing the work or before appointing him on site contractor has to submit his wiring licence to Client) and cable jointers shall be employed to do jointing work. All wires and cables shall bear the manufacturer's label and shall be brought to site in original packing. For all internal wiring FRLS PVC insulated wires of 1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in loop system and no joints shall be allowed in the length of the conductors. No wire shall be drawn into any conduit until all work of any nature that may cause injury to wire is completed. Care shall be taken while pulling out the wires so that no damage occurs to conduits/wire itself, the conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction. The minimum size of FRLS PVC insulated copper conductor wires for all sub-circuit wiring for light points shall be minimum 1.5 sq.mm copper Separate neutral to be pulled for each circuit.

12.0 JOINTS

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switches boxes only. No joints shall be made in conduits and in junction boxes. Conductors shall be continuous from outlet to inlet.

13.0 COLOUR CODE OF CONDUCTORS

Colour code shall be maintained as indicated by the Consultant for the entire wiring installations. Red, yellow, blue shall be for three phases, black for neutral and green with yellow band shall be for earthing.

VII. TECHNICAL SPECIFICATION FOR THE LIGHTING LUMINARIES

1.0 SCOPE

This specification covers the design, material specification, manufacture, testing at works, inspection and delivery at site of light fittings and their associated accessories.

2.0 STANDARDS

The light fittings and their associated accessories such as LED/lamps / tubes, reflector, housings, ballasts/Drivers etc. shall comply with the latest applicable standards. All luminaries, lamps and accessories shall be of same make.

3.0 EARTHING

Each light fitting shall be provided with an earthing terminal suitable for connection to the earthing conductor.

All metal or metal enclosed parts of the housing shall be bonded to the earthing terminal so as to ensure satisfactory earth continuity throughout the fixture.

4.0 PAINTING / FINISH

All surfaces of the fittings shall be thoroughly cleaned and degreased. The fittings shall be free from scale, rust, sharp edges and burrs.

The housing shall be stove-enamelled / epoxy stove-enamelled / vitreous enamelled or anodised as indicated under various types of fitting. The finish of the fitting shall be such that no bright spots are produced either by direct light source or by reflection.

5.0 LED FITTING

Pressure die –cast aluminium housing /CRCA sheet steel housin, aesthetically designed with corrosion resistant powder coated body for heat dissipation. Injection molded PC diffuser for better light transmission and to avoid the POT hole effect.It has got lumen maintenance of L70@ 50,000 burning hours. Universal voltage driver from 100v to 270v/60HZ with mis-wiring protection. Nominal power factor of >0.92, driver efficiency greater than 85% and THD-<15%. Low depth dimension of 80mm to support the lesser mounting height of ceiling with AC ducts. The fixture has got the length of 595mm, width of 595mm and with the height of 80mm.**Compliance-** IP20,Class I

For LED light fittings, the complete luminaire should have a warranty for 5 years which includes the housing + LED + Driver

Conformance Standards for LED lamps:

- LM80 compliance certificate to be provided by the LED manufacturer. LED data sheet should comprise of lumen output, junction temperature, pad temperature, thermal resistance, and LED drive current.

- The luminaire shall conform to IEC 60598 or equivalent standard and the driver should comply with IEC 61347-2-13, IEC 61547, CISPR-15, IEC 62124 and IEC 62384.
- Luminaire should be tested as per BIS 10322 standards and following Test Reports should be submitted: Heat Resistance Test, Thermal Test, Ingress Protection Test, Drop Test,
- Vibration Test, Electrical / Insulation Resistance Test, Endurance Test, Humidity Test, Photometry Test (LM 79 Report), Electronics Test.

LED FITTING:

For LED light fittings, the complete luminaire should have a warranty for 5 years which includes the housing + LED + Driver

During the procurement of LED lighting, the following specification should be followed:-

TECHNICAL REQUIREMENTS FOR LED

- LED efficacy shall be greater than 100 Lumens/Watt (for luminaire system wattage upto 45W)/120 Lumens/Watt (for luminaire system wattage above 45W) @ 350mA drive current. In respect of LEDs of higher power ratings, drive current greater than 350mA can be accepted if the LED's LM 80 / IS: 16105 test reports support the same.
- LED used should be of SMD type only.
- LM – 80 / IS : 16105 Test Reports of specific LED at the soldering point temperature of 850C for the driving current at which the LEDs shall be driven, shall be obtained during procurement.
- Reported life Span of LEDs used in the Luminaire shall be greater than 50,000 Hrs at the soldering point temperature of 850C and at the luminaire driving current.
- The LEDs shall comply to Photo biological Safety norms as per IEC 62471 / EN 64271 / IS: 16108
- View angle: Typical 120°
- Colour temperature of the proposed white colour LED shall be 5700K (i.e. 5665K±355K, as per ANSI standard C78.377A). Colour point should fall within the 7Step McAdam as per ANSI standard C78.377A.
- Colour Rendering Index (CRI); Greater than or equal to 65.
- The make and model of the fitting shall be department approved.

2. Technical requirements for LED driver

- Min. efficiency of driver: 85% (for driver power output rating ≤ 100W); 90% (for driver power output rating > 100W).
- Power factor of complete fitting : Greater than 0.90
- Input Operating Voltage: 140 V to 277V AC.

- In – build high and low voltage cut – offs : 140V (Low) and 277V (High)
- Short circuit protection / Open load protection
- Driver Surge Protection standard: Min 3kV. If a site / location is prone to lightning and surges, 10 k V surge protection (external to the driver circuit) to be provided with the luminaire. The Surge Protection Device (SPD) should fail safe (i.e. without leading to fire hazard) and its failed status should be clearly visible through a flag/indication.
- Total Harmonic Distortion (THD) : Less than 20% at full load
- Tc (Maximum Driver case temperature) must be declared for the luminaire.
- Isolated driver should be used.
- Potting of LED Driver: For driver power output rating $\leq 50W$, potted driver shall be preferable (but not mandatory). But for driver power output rating $> 50W$, potted driver shall be a mandatory requirement.
- The power supply shall be connected to be LED PCBs through proper connectors.
- CMI/EMC compliance: Compliance to the following EMI/EMC standards:
- CISPR 15/IS:6573
-
- IEC: 61547 (reference standards are listed as follows)
 - - IEC 61000 – 4 – 2 / IS:14700 P art 3: Sec 2
 - - IEC 61000 – 4 – 3
 - - IEC 61000 – 4 – 4 / IS: 14700 Part 3L Sec 4
 - - IEC 61000 – 4 – 6
 - - IEC 61000 – 4 – 11 / IS: 14700 Part 3: Sec 11
- IEC: 61000 – 3 – 2 (Class C) / IS:1534 Part 1 (d) IEC: 61 000 – 3 – 3 / IS 14700: part 3: Sec 2
- Driver shall comply with the safety requirements laid down in IEC: 61347 – 2 – 13 / EN: 61347 – 2 – 13 / IS: 15885 – 2 – 13.
- Driver shall also comply with the performance requirements as per IEC: 62384 / IS: 16104.

3. Technical requirements of electronic components used:

- The circuit boards and electronic components to be used in the luminaire should be of rating / type so as to provide reliable functioning. Following shall be the requirements during procurement;
- Junction temperature rating of I.C. shall be obtained for the luminaire.
- Capacitor type and temperature rating shall be obtained for the luminaire.
- Material of resister shall be furnished
- Junction / channel temperature rating of switching device s like MOSFET and transistor shall be obtained.
- MCPCB is to be used for mounting of LEDs
- FR4 grade PCBs of min. thickness of 1.6 mm shall be used in driver circuits

4. Technical requirements of luminaire

- The luminaire shall have LM – 78 / IS: 16106 test report from a NABL accredited laboratory.
- i. The min. system lumen efficacy of the luminaire shall be as follows:
 - i. 80 lm / W (luminaire system wattage $\leq$ 45)
 - ii. 90 lm / W (luminaire system wattage $\geq$ 45)
- The luminaire must have secondary lens/optics. Though the secondary lens/optics does result in minor loss of lumens, it is nevertheless a must to distribute the light output of the LED s so as to achieve the desired polar curve characteristics for the luminaire – no exemption shall be permitted on this account. The material of lens should preferably be PMMA.
- Color temperature: 5700K (5665 $\pm$ 355K, as per ANSI standard C78.377A)
- CRI: Greater than or equal to 65
- Housing of luminaire : Pressure die – cast LM6/ADC12/LM24 housing
- Cover type: Toughened glass or UV stabilized polycarbonate cover
- Housing protection: IP – 65. If the LEDs and LED Driver are in different compartments, then the two compartments must be individually IP – 65. For achieving IP – 65, proper gaskets should be provided.
- Impact Resistance : IK – 05
- Temperature rise test: When the luminaire has stabilized thermally, soldering point temperature of the LEDs must be equal to or less than 85 deg C. Temperature rise (above ambient) of heat sink should generally remain within 20deg C – relaxation on this account can be granted as long as the soldering point temperature limit of 85 deg C is not violated and there is no unacceptable outcome.
- During procurement, the photometric data report in respect of the luminaire offered (through DIALux, CALCULUX or other simulation software) should be obtained. IES Photometric File is also to be supplied and firms to be warned of serious consequences against submission of a tempered/doctored report.

Conformance Standards for LED lamps:

- LM80 compliance certificate to be adhered by the LED manufacturer. LED data sheet should comprise of lumen output, junction temperature, pad temperature, thermal resistance, and LED drive current.
- The luminaire shall conform to IEC 60598 or equivalent standard and the driver should comply with IEC 61347-2-13, IEC 61547, CISPR-15, IEC 62124 and IEC 62384.
- Luminaire should be tested as per BIS 10322 standards and following Test Reports should be submitted: Heat Resistance Test, Thermal Test, Ingress Protection Test, Drop Test, Vibration Test, Electrical / Insulation Resistance Test, Endurance Test, Humidity Test, Photometry Test (LM 79 Report), Electronics .

Minimum LUX levels to be maintained in each rooms

Room	Minimum Lux Level
Waiting Area	300 Lux
Self Accessing Kiosk	350 Lux
Ticketing Room	350 Lux
MC	350 Lux
Female Toilets	150 Lux
Male Toilets	150 Lux
Old Age People Lounge	200 Lux
Office	500 Lux
Public ANC room	250 Lux
VIP Lounge	250 Lux
VIP Toilet	150 Lux
AHU	300 Lux
Electrical room	300 Lux
UPS room	300 Lux
First Aid	250 Lux
Corridor	150 Lux
Video Curtain Room	250 Lux
Service Room	300 Lux
Holding area	300 Lux
Lift Lobby	150 Lux
Lift	150 Lux
Ticket Checking Zone	300 Lux
Pre Checking Hall	300 Lux
Sovenir Shop	300 Lux
Server Room	400 Lux
Control Room/ Checking Office	400 Lux
Open Office	400 Lux
Pantry	500 Lux
Exit Corridor	250 Lux
Area Lighting	50 Lux

VIII. TECHNICAL SPECIFICATION FOR EARTHING

1.0 EARTHING:

1.1 Scope:

This specification covers the supply, installation testing and commissioning of earthing system.

1.2 Standards:

IS 3043 : Code of Practice for earthing
Indian Electricity Rules: 1956
Indian Electricity Act : 1910
And Local Electrical Inspectorate Regulations.

1.3 General Requirements:

The plant shall be provided with complete earthing system comprising earth electrodes in conjunction with earth grid.

1.4 Details of Earthing System:

Unless otherwise specified main earthing shall not be less than 50x6mm GI. flat.

The minimum size of earthing conductor for various equipment shall be as follows:

- a. LT Switch boards, Panels body - 50 x 6 mm G.I flat
- b. Sub Distribution Panels - 25 x 6 mm G.I flat
- c. Distribution Boards - 8 SWG G.I wire

1.5 Earth Electrode:

Earth electrodes shall be erected 1.5 Mtrs away from the building edge and minimum spacing between the earth grids shall be 3mtrs .

1.6 Earthing Layout:

Earthing conductors in outdoor areas shall be buried at least 600mm below finished grade level unless stated otherwise.

Wherever earthing conductors cross cable trenches, underground service ducts, pipes, tunnels, etc. it shall be laid minimum 300 mm below and shall be re-routed in case it fouls with equipment structure foundations.

Tap-connections from the earthing grid to the equipment/structure to be earthed shall be terminated on earthing terminals of the equipment/structure, if the equipment is available at the time of laying the grid, otherwise, "earth riser" shall be provided near the equipment foundation/ pedestal for future connections to the equipment earthing terminals.

Earthing conductors along their run on cable trench ladder columns, beams, walls, etc shall be supported by suitable cleating at intervals of 750 mm. Earthing conductors along cable trenches shall be cleated to the wall nearer to the equipment. Cable trays and supports shall be connected to the earth mat at every 10 meters interval. Wherever it passes through walls, floors, etc GI sleeves shall be provided for the passage of the conductor.

Earthing conductor around the building shall be buried in earth at a minimum distance of 1500 mm from the outer boundary of the building.

1.7 Equipment Earthing:

All electrical power items shall be earthed by two separate and distinct earth connections from main earth bus.

Earthing pads shall be provided by the supplier of the apparatus/equipment at accessible position. The connection between earthing pads and the earthing grid shall be made by short and direct earthing lead free from links and splices.

Electrical continuity shall be ensured by bonding the different sections which are in exposed condition with hand-rails and metallic stairs as applicable as per the site condition.

Metallic pipes, and cable tray sections for cable installation shall be bonded to ensure electrical continuity and connected to earthing conductors at regular interval. Apart from intermediate connections, beginning points shall also be connected to earthing system.

Metallic conduits shall not be used as earth continuity conductor.

Wherever earthing conductor crosses or runs along metallic structures such as gas, water, steam, conduits, pipes etc. and steel reinforcement in concrete, it shall be bonded to the same.

Cable end boxes, glands, etc. shall be connected to the earthing conductor running along with the supply cable which, in turn, shall be connected to earthing grid conductor at minimum two points.

1.8 Jointing:

Earthing connections with equipment earthing pads shall be bolted type. Contact surface shall be free from scale, paint enamel, grease, rust or dirt. Two bolts shall be provided for making each connections. Bolted connections, after being checked and tested shall be taped with PVC tape.

Resistance of the joint shall not be more than the resistance of the equivalent length of the conductor.

1.9 General:

Excavation and refilling of earth necessary for laying of under ground earth bus and earth pipes shall be the responsibility of the Contractor.

All earth electrodes shall be tested for earth resistances.

Overall Earthing resistance of the main bus shall be measured after connecting all the electrodes to the bus and the resistance shall not exceed one (1) ohm.

Tentative drawing of Earth layout will be provided by department. However, the exact location of Earth Bus/conductor, earth electrodes and earthing points on the equipment shall be determined at site in consultation with department. Any change of methods, routing, and size of conductor shall be subject to approval by Owner.

IX. TECHNICAL SPECIFICATION FOR INSTALLATION

1.0 GENERAL:

The electrical installation shall be complete in all respects and any item not included in the specification but essential for proper installation and functioning of the electrical system shall deemed to be included in the scope of the specification whether specifically mentioned or not.

All equipment shall be shifted from the place of storage to erection site by the Contractor and shall be thoroughly cleaned of packing materials, scales, rust, oil, grease etc prior to commencement of the installation work. All equipments shall be checked physically for the completeness of all devices before taking up installation.

After installation all unused cable/conduit entries shall be efficiently sealed.

All equipments and accessories shall be installed strictly in accordance with the manufacturer's instructions/ drawings. Equipments supplied in sections or dismantled condition shall be reassembled at site with all associated accessories as per the manufacturer's instructions. All accessories required like hardware, junction box glands, hylam sheets etc. shall be supplied by Contractor.

A Model installation shall be made for approval by the Client, before proceeding with the final installation.

The system under the scope of work shall conform to the latest codes and standards as amended in the respective technical specification and schedule of works. Nothing in the specification shall be construed to relieved the successful tenderer's from the responsibilities where specifically mentioned in the tender or not.

The following standards as amended shall also to be covered.

Installation:

All electrical works shall comply with following standards:

Indian Electricity Rules – 1956.

Central Electricity Authority Guidelines on electrical installation

IS 10028	Code of Practice for installation of transformers
IS 732	Code of Practice for electrical wiring installation
IS 5216	Guide for safety procedures & practices in electrical work
IS 10118	Code of practice for section, installation and maintenance of LT Switch, switch gears & control gears.
IS:12063	: Degree of Protection provided by enclosures
IS:8623	: Specification for Factory Built Assemblies for Voltages upto 1000V AC & 1200V DC
IS:1646	: Code of Practice for Fire Safety of Buildings (General) Electrical Installation
IS:3043	: Code of Practice for Earthing

Workmanship shall be highest standard and /quality.

EQUIPMENT AND MATERIALS

All equipment and materials supplied by the Contractor shall be suitable in all respects, for the type of environment specified.

All equipment and materials supplied shall be subjected to the approval of the department regarding Quality, Conformity to the specification and standards and suitability for the specified site conditions.

STORAGE AND CARE PRIOR TO ERECTION

The Contractor shall be fully responsible for the safe storage and care of equipment and materials. The Contractor shall be responsible for care and maintenance of all the Electrical equipments, whether supplied /erected by him, after the installation is completed and until the final certificate of acceptance of Electrical Installation is signed.

Equipments:

All equipments shall be installed strictly in accordance with manufacturer's instructions / drawings.

All LT panels shall be erected on suitable base frame / MS Channel.

Distribution boards shall be erected on wall such that height of top of board will be at 1800 mm in general. Deviation if any required during execution shall be intimated by the department.

Switch boards / MCCs shall be erected with a front clearance of not less than 1000 mm and a clearance of not less than 750 mm at the rear clearance of there are cable entries or with a rear clearance of less than 200 mm in case there are no cable entries or attachments at the rear.

LV PANELS

All busbar joints shall be tightened using torque wrench and all shipping sections shall be properly bolted together.

After completion of cable terminations, all unused cable entry holes are to be covered to make the panel vermin proof.

CABLES:

Cable shall be taken on trays fixed on ceiling / wall.

All cable shall be provided with punched aluminium identification tags at every 100 m interval at both ends.

EARTHING:

Earthing shall be as per IS 3043 in general.

All electrical power items shall be earthed by two separate and distinct earth connections from main earth bus.

General grounding shall be done to achieve earth resistance of less than 1 Ohms.

Body earthing shall be done to achieve earth resistance of less than 5 Ohms.

Earth electrodes shall be erected 1500 mm away from the building edge and minimum spacing between the earth grid shall be 3000 mm.

Earth electrodes – 38 mm Dia GI pipe 3 m long with 600 x 600 x 3mm Copper (or) 600 x 600 x 6mm GI plate earthing.

TYPE OF WIRING:

Substation building, electrical rooms : concealed / open wiring using M.S conduit

General office & Toilet areas : concealed / open conduit wiring

Using MS conduit above false

Ceiling & concealed wiring

Below false ceiling

DISTRIBUTION BOARDS:

All DBs shall be phase segregated type as required by the Electrical Inspectorate.

All DBs shall be powder coated, double door type or polycarbonate thermosetting enclosure with double door as per BOQ / department specification.

All MCB breaking capacity shall be 10 KA.

Necessary clearance shall be maintained in front of the Distribution Boards for operation and maintenance

All equipment shall be thoroughly cleaned of packing materials, scales, rust, oil, grease etc prior to commencement of the installation work.

All equipments shall be checked physically for the completeness of all devices before taking up installation.

All equipments and accessories shall be installed strictly in accordance with the manufacturer's instructions/ drawings. Equipments supplied in sections or dismantled condition shall be reassembled at site with all associated accessories as per the manufacture's instructions. All accessories required like hardware, junction box glands, hylam sheets etc to be supplied by contractor.

3.0 LIGHTING:

The Installation charges shall include all fixing accessories like screws, anchor fasteners, clamps, cleats, down rods, ball socket, earthing, cabling and wiring works etc. The AC lighting shall operate at 230V, 1 Phase, the supply being taken from the lighting DB.

3.1 Indoor Lighting:

Concealed / Open conduit system using MS conduits above false ceiling and concealed conduit system below false ceiling, shall be adopted, as required and as specified in BOQ.

Conduit pipes, whenever necessary, shall be fixed by 16 SWG saddles with spacers, in an approved manner at intervals of every 300mm.

Saddles shall be fixed on either side of couplers, bends or similar fittings at a distance of 300mm from the centre of such fittings.

The cost of saddles, clamp etc., shall be deemed to have been included in the installation charges.

Switches of lighting circuits shall be mounted at 1200mm above finished floor level.

Where fittings are suspended, ball and socket type suspension units shall be used.

Earth continuity shall be maintained throughout the entire installation.

4.0 CABLING:

No cable shall be laid along side a water main. Spacing equal to the diameter of the cable shall be maintained between adjacent power cables.

All due care shall be taken during unreeling, laying and termination of cable, to avoid damage due to twist, kink and sharp bends, etc. Wherever cables pass through floor or through wall openings, it shall be taken through Al. pipe sleeves. The open ends of the sleeves shall be sealed by cold setting compound after cables are pulled through them to prevent entry of vermin and ingress of water.

While laying cable, cable rollers shall be used at an interval of 2.0 Mts. The cables shall be pushed over the rollers positioned between roller supports. The cable shall not be pulled from the end without intermediate pushing arrangement. The bending radius shall not be less than that specified by the manufacturer.

Each cable shall be provided with an identification tags at entrance and exit from any equipment. The tag shall be of aluminium, with the number punched on it and securely attached to the cable by not less than two turns of GI wire.

Single core cables shall be laid in trefoil formation and clamped with trefoil clamps at every 600mm intervals.

All multi core cables shall be secured to the cable tray by clamps at every 600mm intervals.

Cables from overhead cable trays to the equipment shall be taken in prefabricated cable tray with cover/GI Pipe sleeves.

4.2 Laid On Cable Tray:

The cables inside the plant buildings shall be taken on trays fixed on the ceiling.

Cable trays shall be of prefabricated GI (2.5mm thick) with necessary accessories like Tees/Bends etc. and shall be supplied along with fasteners.

Cable trays shall be hot dip galvanised as per IS: 2629.

The top tray shall be provided with cover if required wherever necessary.

Galvanised angle supports for trays shall be welded to insert plates. The support shall be spaced at 1500 mm centres and painted with one coat of primer and one coat of epoxy paints.

Cables inside the premises shall be taken on cable trays running on ceiling.

Vertical spacing between cable racks/trays shall be minimum 300 mm. Different voltage grade cables shall be laid in separate trays when trays are arranged in tiers.

Contractor shall include in their scope of supply all Insert plates, Anchor fasteners, etc. required for the laying of cable trays. Fastening on walls/RCC columns shall be by Anchor Fasteners only.

4.3 Cable Termination:

Termination and jointing of LT XLPE /PVC armoured cables shall be by means of compression method using double compression type glands and compression type lugs. Control cables are to be terminated by means of terminal lugs; the same shall be of tinned copper compression type.

Whenever aluminium cables are to be terminated on copper busbar or vice versa, necessary bimetallic washers shall be provided. All control cables shall be terminated using pin type lugs.

Cable tails shall be sufficiently long to run all cores to the farther most terminal and then back to the appropriate point of connection.

All cable glands shall be properly earthed using suitable earthing clips and connected to main earth bus. Wherever required, extension boxes shall be provided.

Cable tails shall be sufficiently long to run all cores to the farther most terminal and then back to the appropriate point of connection.

HT cables shall be terminated / jointed by means of cold setting epoxy based cast resin jointing kits as heat shrinkable type or cold setting kit.

5.0 EQUIPMENT ERECTION:

LT switch boards shall be handled and erected as per the relevant codes of practice and manufacturer's drawings and instruction manuals.

LT Panels shall be erected on suitable base frame.

The details of foundation pockets required for grouting the frame shall be furnished by the Electrical Contractor.

6.0 EARTHING:

The overall earth resistance of the system shall not be greater than one (1) ohm or as per the department specification.

All panels, Distribution boards shall be provided with two (2) independent earth connections of adequate capacity to discharge the max. Earth fault current.

The size of Earth bus and earth electrode shall be as per specification and as per schedule.

Minimum spacing between earth electrodes shall be provided as per IS: 3043.

Water stops shall be provided wherever earthing conductor enters the building from outside, below grade level.

7.0 INSPECTION:

After completion of erection/installation, each piece of equipment shall be thoroughly inspected in the presence of Contractor for correctness and completion of erection and operation.

8.0 MISCELLANEOUS ITEMS:

The contractor shall supply and install the safety devices as required by the statutory authorities but not limited to the following, for each Substations

- a) Danger boards for LT Panels
- b) Rubber mats for switchgear panels, power distribution boards etc.
- c) Rubber gloves, first aid charts, first aid box etc.
- d) Fire Buckets
- e) Discharge rods.

X. TECHNICAL SPECIFICATION FOR TESTING AND COMMISSIONING

1.0 GENERAL:

The testing and commissioning for all electrical equipment at site shall be according to the procedures laid down below:

All electrical equipment shall be installed, tested and commissioned in accordance with the latest relevant Standards and Codes of Practices published by Indian Standards Institution wherever applicable and stipulations made in relevant general specifications.

The testing of all electrical equipment as well as the system as a whole shall be carried out to ensure that the equipment and its components are in satisfactory condition and will successfully perform its functional operation. The inspection of the equipment shall be carried out to ensure that all materials, workmanship and installation conform to the accepted design, engineering and construction standards, as well as accepted codes of practice and stipulations made in the relevant general specifications.

All tests shall be carried out by the Contractor using his own instruments, testing equipment as well as qualified testing personnel.

The results of all tests shall be conforming to the specification requirements as well as any specific performance data guaranteed during finalisation of the contract.

2.0 PREPARATION OF THE ELECTRICAL SYSTEM FOR COMMISSIONING:

After completion of the installation at site and for the preparation of Electrical system commissioning, the contractor shall carry out check and testing of all equipment and installation in accordance with the agreed standards, codes of Practice of Indian Standards Institution and specific instruction furnished by the particular equipment suppliers.

Checking required to be made on all equipment and installations at site shall comprise, but not be limited, to the following:

The following checks shall be made on all equipment and installations at site:

- i. Physical inspection for removal of any foreign bodies, external defects, such as damaged insulators, loose connecting bolts, loose foundation bolts etc.
- ii. Check for grease, insulating/lubricating oil leakage and its proper quantity.
- iii. Check for the free movement of mechanism for the circuit breakers, rotating part of the rotating machines and devices.
- iv. Check for tightness of all-cable, busbars at termination/ joints ends as well as earth connections in the main earthing network.
- v. Check for clearance of live busbars and connectors from the metal enclosure.
- vi. Check for proper alignment of all draw out device like draw out type circuit-breakers.

- vii. Continuity check in case of power cables.
- viii. Checking of all mechanical and electrical interlocks including tripping of breakers using manual operation of relay.
- ix. Checking of alarm and annunciation circuits by manual actuation of relevant relays.
- x. Check and calibrate devices requiring field adjustment/ calibration like adjustment of relay settings etc.
- xi. Check proper connection to earth network of all noncurrent carrying parts of the equipment and installation.
- xii. Test reports for all meters are to be furnished.

The tests that shall be carried out on the equipment shall include but not be limited to the above.

2.3 Low Voltage Switchgear (upto 1000V AC or 1200V DC):

- i. Insulation resistance test with 1000V megger for main circuits. The minimum value of insulation resistance shall be more than 10 Mega ohm or as per the department specification.
- ii. Insulation resistance test with 500V megger for control, metering and relaying circuits. The minimum value of insulation resistance shall be one Meg ohm.
- iii. Relay operation test by primary & secondary injection method.
- iv. Functional tests of control circuit.
- v. Checking of settings of all relay/releases as per single line diagram/specification.
- vi. ON/OFF operation of breakers both manually and electrically in "Test" as well as "Service" positions.

2.4 Cables:

- i. Insulation resistance test with 2,500 V megger for high voltage power cables rated above 1.1 KV grade and 1,000 V megger for cables rated up to 1.1 KV grade.
- ii. All cables of 1.1 KV and all H.V. cables shall be subjected to high voltage test after joining and terminating but before commissioning as per relevant standards.
- iii. In each test, the metallic sheath/screen/armour should be connected to earth.
- iv. Continuity of all the cores, correctness of all connections as per wiring diagram, correctness of polarity and phasing of power cables and proper earth connection of cable glands, cable boxes, armour and metallic sheath, shall be checked.

2.5 Earthing System:

- i. Tests to ensure continuity of all earth connections.
- ii. Tests to obtain earth resistance of the complete network by using earth tester. The test values obtained shall be within the limits.

All documents / records regarding test data, oscillographs and other measured values of important parameters finalised after site adjustment shall be handed over to the Owner in the form of test.

XI. TECHNICAL SPECIFICATION FOR UPS

APPLICATION

To provide Un-interrupted power supply to loads viz.,

- Hub switches
- Emergency lighting
- AV equipment's
- FAPA equipment

1.0 GENERAL

Conventional UPS systems shall be with on-line technology, with IGBT rectifier and External isolation transformers for galvanic isolation..

1.1 Scope of Work

- The scope covers supply, installation, testing and commissioning of Conventional type UPS systems.
- Supply of Battery banks with battery.
- Supply of cables and inter connection between battery banks and battery switchgear and UPS system.
- Necessary filters to reduce the THD levels (as specified in data sheet).
- Supply of cables and interconnection between filters and UPS system, if the filter is a standalone arrangement.
- Making suitable arrangement in busbar to suit the required No. of input & output cable terminations.

1.3 Submittals

Contractor shall provide the following within 3 days upon finalization of contract,

- Conventional UPS rating offered and configuration with distribution scheme.
- All circuit breakers and disconnects shall be identified by location, frame size, trip setting, and with manufacturer type and number.
- Various equipment foot prints including weights, dimensions, service access, heat dissipation at different loads and airflow requirements of each unit.
- Foot prints of battery racks, type of battery including overall weight of battery proposed for installation.
- Full system schematic wiring diagram.
- Operating sequence of the Conventional UPS system in Microsoft Word for Windows format.

1.4 Battery limits.

Complete system Supply, installation, testing and commissioning should be part of the electrical vendor scope.

1.5 Expectations.

- The bidder shall go through the room layouts provided along with the bid documents and confirm the space envisaged.
- The bidder shall precisely specify whether system offered by him is
 - o With filter is built in
 - o With standalone filters.
 - o No. of racks required for battery back up.
 - o Parallel output is one from each system or to suit design.
- The bidder shall provide a room layout along with the bid document to suit the components and equipments offered by him or confirm that the layout proposed is in order to house the equipments proposed.
- The successful vendor shall co- ordinate with Main Electrical Contractor and other agencies.
- The vendor shall furnish details on MTBF, response time for attending to system failure.

1.6 Co – ordination.

Co-ordinate the work with other agencies, especially electrical for proper input and output connectivity.

Co-ordinate with electrical contractor for connectivity of filter in the circuit. Any change required in the design of switchboard shall be intimated along with submission of tender documents.

1.7 References and Codes

This specification shall be read in conjunction with the complete tender conditions and relevant standards.

1.8 Operation and Maintenance Data

The vendor shall provide the following within 1 month of contract finalization,

- a) Operation and maintenance manual
- b) Equipment details with diagrams.
- c) Precautions for safe operations.
- d) Procedures to be followed for installation and commissioning.
- e) Details for maintenance..
- f) System continuous – kVA and KW rating as per scheme and Data Sheet
- g) Power factor
- h) Current In-Rush Limiting: 20 percent to 100 percent of full rated load over 15 seconds.
- i) Magnetizing Sub cycle In-Rush: maximum eight times normal full load input current.

1.9 Project Conditions

The Contractor shall inspect drawings, visit the site, check aspects of required work and refer any discrepancy to the Consultant / Employer.

1.10 Warranty end Maintenance

The installation shall be guaranteed against faulty workmanship for minimum of one year from the date of practical completion. All faulty workmanship shall be replaced and restored to full operation at no cost to the Employer within the guarantee period.

Manufacturer's guarantees and warranties shall be handover to Employer.
Once the warranty expires the Employer may at his discretion enter in to an annual maintenance contract (AMC) or ask, the Specialist Agency to support the maintenance of the system on a per call basis with the same commitment as in the case of AMC.

2 SYSTEM DESCRIPTION/CONFIGURATIONS.

- The Technology shall be True-On-Line, with IGBT rectifier and built in isolation transformer.
- The UPS systems considered should be suitable for different type of configurations and usage.
- The systems configured for different areas of same capacity shall be suitable for parallel operations when re configured. Necessary paralleling cards and software shall be provided as part of UPS system supply.
- Continuous power to the load shall be maintained for a period as indicated in the bill of material.
- The UPS system shall consist number of modules of the same capacity-sharing load. The system shall be a "N+N" and N + 1 as enumerated in drawings and data sheets and bill of materials and quantities.
- The UPS system shall be isolated or parallel redundant operation. The UPS system shall have one module more than that required to supply the full-rated load. The UPS system shall be sized to provide the minimum required kVA and the minimum required kW output with one UPS module out of service. Fully rated static and maintenance bypass switches shall be provided in separate enclosures for safe operations.
- The UPS system shall be sized to maintain a kVA as per Bill of Material, and be equipped with a battery able to supply this load for the time as indicated in Bill of Materials and Data Sheet, at a temperature of 25 degrees C. The battery is to provide 100 percent of the specified capacity.
- UPS should have an internal kit for the paralleling, for paralleling up to 3 modules. For paralleling no extra by-pass line element or additional static switches should be required, same module need to be added for the paralleling without any additional hardwares.
- Components: System shall include battery to provide continuous source of electrical power; rectifier/battery charger to maintain battery charge and to provide input to inverter when utility power is available; inverter to provide power to load during normal operation; static switches to transfer load automatically and without disturbance between inverter and utility power in case of inverter failure; manual switches to bypass static switches for maintenance; input and output filters to provide appropriate disturbance attenuation; and necessary monitors, sensors, and control circuits.
- Utility Power Available: Rectifier/charger shall supply load through inverter and maintain battery in fully charged float condition. System power walk-in shall be accomplished within 15 seconds of energizing, with provision for an adjustable timer function to delay start of power walk-in to facilitate power restart from a generator.
Utility Power Failure: Load shall be supplied from battery through static inverter if utility power drops below preset limits, or fails. There shall be no output disturbance transmitted to load.

- Upon restoration of Utility Power : Rectifier/charger shall supply power to load through inverter while it recharges battery. There shall be no output disturbance transmitted to load. Rectifier/Charger or Battery Failure: Static switch shall transfer load to synchronized utility power, without disturbance, when inverter output deviates beyond specified quality limits. When inverter output returns to acceptable operation, it shall synchronize to utility power, and after preset timing interval, static switch shall return load to inverter without disturbance.
- Overload or Short Circuit: UPS shall be provided with breakers with O/L & S/C protection. Static switch shall transfer load to utility power during load inrush and clearing of faulted branch circuits; load shall automatically transfer back to inverter without disturbance.

Inverter Failure: In the event of failure of all inverters static switch shall transfer to utility power without disturbance and remain until manually returned. In the event of failure of an individual inverter, the load will be shared by the remaining modules without disturbance.

- Maintenance Operation: For simultaneous maintenance of all parallel modules load shall be transferred manually to utility power using bypass switch. During bypass mode, operation of system or static switch shall not affect power to load. For maintenance of an individual module, load shall be shared by remaining modules.

3 OTHER REQUIREMENTS.

- Necessary software for remote status monitoring and controls.
- BMS compatible with suitable protocol.
- Communication ports – Ethernet / RS 485 and RS 232.
- System shall be suitable for parallel operations – whether specified or not.
- Steel supports for installation of UPS systems in case of false flooring
- Steel supports for installation of Battery Cabinets in case of false flooring.
- The input power supply connectivity shall be at a minimum height of 500 mm from the bottom most sheet steel cover, incase of bottom entry of cables.
- The system shall be suitable static transfer with static bypass switch and a Maintenance bypass switch.
- In case of additional cable entry box provision, the input and output bus shall be extended to the cable alley portion for easy connectivity and maintenance of the cabling arrangement.
- Necessary Filters shall be provided to control the THD levels as specified in the data sheet & it shall be suitable for individual unit compensation and not combined.
- The UPS systems supplied shall be capable of withstanding any of the Following combination of environmental conditions.
Temp: - 0 deg C to plus 40 deg C
Humidity: Relative humidity up to 95 % non condensing.
- Controls

The UPS system shall have microprocessor based controls for monitoring and operation of the UPS system. Bidder to indicate the type of communication protocol supported by the system along with the details of links provided in the system. The control system shall operate on Windows or eqvt. Platform.

The below mentioned functions shall be possible for reading on the UPS system digital monitor and from remote/communication port.

- AC Input and UPS output voltage
 - AC Input Current
 - Input and Output kVA
 - Input and output kW.
 - Input and output PF.
 - Output current
 - Input Frequency
 - DC meter for battery voltage
 - DC battery time remaining.
 - The control shall have additional controls viz.,
 - Output frequency selector
 - Alarm acknowledge
 - LED test
 - Lamp test and reset push button.
 - Input power fail.
 - UPS – ON
 - Bypass ON
 - Low Battery
 - Over load.
 - Over temperature
 - Emergency power off.
 - Bypass fail.
 - Fan failure
 - Battery circuit breaker / switch open
 - DC ground fault
 - DC over voltage.
- Audible Alarm – The system shall comprise of an audible alarm and dBA level shall be not less than 60. The audible alarm shall get activated in case of malfunction of system.
 - Cooling arrangements: The cooling arrangement shall ensure that all the UPS system components operate within the recommended environmental ratings. Air filters provided shall be easily accessible without shutting UPS system.

- **Harmonics**

Necessary input and output filters shall be provided or the Rectifier and Inverter design shall be such that the harmonics injected back to the source and to the load shall be within limits specified in the data sheet at the point of coupling of the UPS to the system. The fault level of the system at the point of common coupling shall be as specified in data sheet.

4 PROTECTION TO UPS SYSTEM.

Each UPS system shall have built in protection for over voltage power surges, under voltages and over current from AC input and over voltage surges from paralleled arrangement, load

switching and operation of circuit breakers in the distribution system. Further the system shall be protected from over current and short circuit at the output terminals.

Paralleled redundant systems shall be provided with control logic to contain the fault tripping the other modules also.

Each UPS system shall have exclusive control and monitoring arrangement with meters, alarms, touch screen. Failure of control circuit shall not inhibit operation of UPS system.

The breakers selected in the UPS system shall be suitable for discrimination and co-ordination between upstream and downstream distribution arrangement.

- **Static bypass Transfer**
The UPS system shall be provided with fully rated solid state static bypass transfer switch which is suitable for make before break or overlap transfer of the load from UPS output to the Grid power. The vendor shall take the consent of end user before enabling this. The restoration of power from Grid to UPS shall be automatic without causing shut down of any loads.
- **Transfer conditions.**
The System shall switch over to Grid power when
Inverter on under voltage – < 85% of nominal
Inverter on over voltage - > 115% of nominal.
- **Maintenance bypass**
Manually operated maintenance bypass switch shall be provided to enable bypass of critical loads ie., to grid power without interruption of power to those loads by electrically isolating the static bypass and inverter from the bypass grid power. The switch shall be rated for full kVA of the system.

5 COMMUNICATION.

The UPS shall be suitable for BMS compatibility with hardware & software items for third party integration with MODBUS protocol.

Necessary cards/modules shall be included for above requirements.

Following shall be the minimum parameters (shall not be limited to) to be communicated to BMS :

- a) Voltage -1Phase & 3Phase
- b) Current – Individual phases & average.
- c) kW – Individual phases & average.
- d) kVA – Individual phases & average.
- e) Battery status, current & Voltage.

In a standard version the UPS shall be equipped with a customer interface card which provide:

- 6 output dry contact available on terminal blocks (NO / NC), these contacts shall be programmable out of 24 different alarms or events directly from the keyboard mounted on the front panel of the UPS.
- Input Connections for customer provided signals must be available for "generator on" (reduces battery charging current during mains failures) and "emergency power off" (to shutdown UPS and load, only in the event of an emergency).

- RS232 port for the following purposes:
serial communication for advanced remote monitoring communication via PC, serial printer connection, modem connection.

6 Batteries:

- The batteries shall be of **12Volts as specified in the BOQ/technical data sheet, sealed maintenance free type.**
- The battery backup time shall be as specified in Data Sheet. The bidder shall choose the required voltage of the battery. The AH capacity of battery shall be chosen by Bidder, based on the battery back up time / duty cycle, ageing factor and minimum ambient temp. Specified in data sheet and the guaranteed efficiency of the inverter system offered.
- The batteries shall be mounted in suitable rack / cabinet as specified in the BOQ / Data sheet. The rack / cabinet shall be made out angle iron frame / CRCA sheet considering the weight of batteries. The paint shade of rack / cabinet shall be same as UPS shade.
- The battery shall be of a heavy duty industrial type designed for standby power service. The cells shall be of completely sealed maintenance free type.
- Tendered shall specify the recommended voltage per cell for float charging and recharging, acceptable electrolyte specific gravity when fully charged at 25 degrees C.
- The design life span of the battery shall not be less than Max for 3yrs, as these batteries are replaced every 5 years
- The UPS system must be provided with a manual and automatic battery test (pre-selectable by day of the week, time of day, date of the month). The test operates by slowly initiating a linear decrease of the rectifier output voltage. If a battery fault is detected, the rectifier voltage will return to nominal avoiding to transfer the critical load on by-pass. Automatic battery test by simply shutting down the rectifier is not permitted.

Battery breaker, cabling & cabinet:

- The MCCB or ACB provided for battery circuit shall be suitable for DC applications.
- In case of 2 or 3 strings of batteries, each string shall have individual MCCBs. The rating of MCCB & copper cables shall be such that, in the event of failure or maintenance of one string, the other strings shall take the full load of UPS.
- The rating of battery breaker shall be designed considering maximum DC current & short circuit current ratings.
- The MCCB or ACB shall be housed in a suitable enclosure with minimum of IP:41 class of protection.
- The paint shade of rack / cabinet shall be same as UPS shade.
- The cabling between batteries, battery bank to UPS shall be done with FRLS insulated copper conductor cables.(Low loss cables)
- A battery supply monitoring system shall be supplied along with battery breaker enclosure which shall be further connected to UPS.

7 INSTALLATION, TESTING & COMMISSIONING OF UPS SYSTEMS AND BATTERIES.

7.1 Installation:

The UPS System and batteries shall be unloaded, lead and un packed in safe condition. While erecting the UPS, if the module sizes are large (more than 2Mts wide) , the module shall be split in to two or three parts & taken up to the floor levels. The modules shall be rearranged at floor level & interconnected to for single module.

The system and batteries shall be installed carefully as per manufacturer's instructions. The vendor shall carryout inter connection of battery cables and to the main battery breaker. The system and battery rack/cabinet shall be safely secured to the floor using fabricated steel frames or Anchor fasteners as the case may be.

Vendor shall consider the powder coated angle iron frame for mounting the UPS & necessitate the cable terminations. The minimum height of the frame shall be 350mm in case of floor mounting & 600mm in case of false floor mounting.

Vendor shall take the over all responsibility of carrying the UPS modules up to the UPS room levels, give necessary inputs to civil or interior contractors to make necessary provision for erecting the UPS.

7.2 Tests :

- Conduct physical test at site and check for damages to system if any on external.
- Check component by component for likely damages during transit.
- Check for tightness of every component and internal wiring.
- Bidder shall furnish his quality assurance plan for the equipment offered. The quality assurance plan shall include bought out components and assemblies used in the UPS system.
- Conduct site tests vide technical specification.
- The vendor shall conduct all relevant tests (routine tests) and special tests on UPS and Battery systems at the place of manufacture and at site.
- System tests shall be performed on the completely assembled UPS system. System tests shall include frequency regulations. Voltage regulation, current limiting feature and harmonic content tests in addition to the tests to prove the functional requirements such synchronization with range of adjustments, transfer of static switches for conditions of loss of square wave, overload and under voltage conditions.
- Endurance test on static switches shall be performed for not less than 10 transfer / retransfer cycles at full load.
- The complete assembled UPS system shall be operated at rated load under relevant ambient conditions for not less than 96 hours continuously prior to release for shipment.
- Check that the breakers provided on UPS system are co-ordinated with other upstream and downstream breakers.
- Check whether the temperature maintained inside UPS room is adequate and are as per manufacturer requirements.

Minimum tests to be conducted before despatch at works:

- Load tests with resistive load.
- Overload load test for 1, 10 & 30minutes.
- Measure THD levels at : no load, 25%, 50%, 75% & 100% loads.
- Efficiency test 25%, 50%, 75% & 100% loads.
- Synchronizing test.
- 100% unbalance test.

These tests shall form part of this contract. The test results shall match with the technical requirements specified in the technical data sheet.

The tests will be witnessed by consultant / client at works. The supplier shall provide advance information for pre dispatch tests conducted at works. Vendor shall consider necessary travel & staying charges for a representative from Consultant, Client & PMC.

The Consultant / Employer shall have the right to accept or reject the modules if it does not meet the technical requirements.

7.5 **Commissioning:**

The vendor shall inform the consultant / owner to witness all the tests.

The Contractor shall give minimum 7 working days notice to the Consultant / Employer before commencing commissioning.

The Contractor shall be responsible for the testing and satisfactory performance of the complete UPS system which shall include as a minimum:

- (a) Switch off all the output breakers that are connected to the load. Run the UPS in no load condition at least for 15 minutes.
- (b) Measure and confirm output voltage. Phase difference, frequency and all other specified parameter are within the allowed range.
- (c) Conduct the load test of the UPS system by connecting the UPS to a dummy load like water load Contractor shall arrange for test facility (If mentioned in the BOQ).
- (d) Measure and confirm at full load, voltage, frequency, phase difference, Battery backup time, battery charging current, DC ripple, parallel redundancy operation, and all other necessary and/or specified parameters are within the approved range.
- (e) Once the result of the load test is satisfactory, and approval is received for connecting the power to the electric circuit; connect the UPS output to the actual computer load.
- (f) Check for any malfunctioning with the computers and UPS system. Observe for 15 minutes.
- (g) Vendor shall complete work & ensure operating parameters like paralleling, load sharing etc.. of UPS systems are functioning satisfactorily.

8 **OTHER REQUIREMENTS**

8.1 **Spares**

Bidder shall indicate the list of spares with quantities as recommended by him for three years trouble free operation.

The offer shall include list and quantity of Start-Up spares required for commissioning of the equipment.

8.2 **Manuals & shop drawings**

Three sets of following shop drawings shall be submitted for approval from Consultants/Client:

- UPS power block diagram
- UPS connection diagram with battery, cable sizes etc..
- UPS General arrangement drawings
- Battery rack general arrangement drawings
- UPS room layouts with actual sizes of UPS & battery racks.

Two sets of all manuals with detailed drawings for the systems, including instruction, administration and maintenance manuals shall be submitted to the Consultant / Employer.

8.3 **As-built Drawings**

As-built drawings as specified in the contract shall be submitted to the Consultant / Employer on completion of work.

Drawing shall clearly show physical layout, model number of UPS System and battery model and capacity and all other relevant details.

8.4 **Clean Site**

The Contractor shall leave the site in a tidy condition, free from rubbish to the satisfaction of the Consultant / Client.

9.5 **Technical Data Sheet**

Salient features as required are indicated in the accompanying pages. Some minimum requirement is indicated in relevant columns.

Contractor to fill up other columns appropriately while submitting the tender without fail. If data sheet is not filled, the offer shall not be considered.

Annexure -B**LIST OF APPROVED MAKES / VENDORS for CIVIL ITEMS**

S. No	ITEMS	VENDOR/MAKE
1	Cement	Zuari, ACC, L&T, Priya, Rajashree, Grasim, J.P Rewa, Vikram, Shree Cement, Dalmia, Penna, Brila Jute or as approved.
2	Concrete Admixtures	Fosroc/ Sika/ BASF
3	HYSD (TMT) Bars): Fe 500 D	SAIL, RINL-VIZAG, TATA, JSW STEEL or equivalent.
4	Structural Steel	SAIL, TISCO or as approved
5	Chloropyriphos	DE-NOCIL, Cynamide or as approved
6	Aluminium Sections	Bhoruka /Hindalco /Jindal
7	. Flush Door	Kutty/Diamond/Sakthi/ Kailash
8	Fire Resistance Door	Shakthi/Schodher/ Godrej/Sukri/ Pacific or equivalent
10	Glass / Float Glass	Saint Gobain/Asahi/ Modiguard or as approved
11	Vitrified Ceramic Tiles	RAK / Nitco / Johnson / Khajaria/ Somany tiles
12	Water Proofing Compound	BASF/Fosroc/Cico/Sika/ FAB
13	Water proof Cement	Snowcem India Ltd or as approved paint
14	PVC Pipe/ CPVC pipes	Finolex/Supreme/True Bore/ Ashrvad/ Astra/ Flowguard or as approved
15	Chicken Mesh	Arpitha Export or as approved
16	Paints	Asian Paints / ICI Dulux/ Berger
17	White Cement	JK Cement / Birla White
18	Stainless Steel	SS-316L grade
19	Gypsum Board	India Gypsum co ltd / Armstrong
20	Sealant	GE / dow corning / Fosroc / Wacker
21	PVC rungs	Arpitha Export / KGM associates
22	Water supply pipe & fittings	George Fischer / Astral/ Jaguar/ Finolex / Supreme/ Ashirwad/ Sudhakar/ Prince
23	Sewer pipe & fittings	Finolex / Truebore / Supreme/ Ashirwad
24	Bitumen	Indian Oil / Hindustan Petroleum
25	HDPE Water Tanks	Sintex
26	MS Pipe	SAIL / TATA steel / Jindal
27	Fastener	Hilti / Fischer
28	Sealing compounds	Fosroc / Apoorva / STP
29	Floor springs	Everite / Godrej / Garnish
30	Door Closer	Dorma / Dorset/ Everite
31	Sanitary ware	Jaquar / Cera / Kohler or equivalent reputed make
32	HDPE Pipes	Reliance, Nandi, Jain or as approved
33	Galvalume sheet	"TATA BlueScope", "Lloyd" , Interacrh, JSW or equivalent
34	UPVC	Fenesta, Aparna, Qute or equivalent
35	ACP	Alubond, Alucobond or equivalent

LIST OF APPROVED MAKES FOR ELECTRICAL ITEMS

S. No	Item	Vendor / Make	Vendor Compliance
1)	Modular Switches & 5A/15A Sockets	LEGRAND / MK.	
2)	PVC Wires	FINOLEX / LAPP/ POLYCAB	
3)	Sockets & Plugs (with Polycarbonate/FRP/ Metal Clad Body)	ABB / LEGRAND / SCHNEIDER / HENSEL	
4)	Light fittings (Indoor)	PHILIPS / OSRAM / ENDO LIGHTING IGUZZINI / JAQUAR / LIGHTINGTECHNOLOGIES /WIPRO TRILUX / BAJAJ / HAVELLS / CROMPTON GREAVES	
5)	Light fittings (Outdoor)	PHILIPS / OSRAM / ENDO LIGHTING IGUZZINI / JAQUAR / LIGHTINGTECHNOLOGIES /WIPRO TRILUX / BAJAJ / HAVELLS / CROMPTON GREAVES / SHREDER	
6)	Lighting Control Sensor	HONEYWELL /SCHNEIDER / LUTRON WIPRO / PHILIPS / LEGRAND	
7)	BLDC Ceiling Fans	Versa Drives	
8)	Exhaust Fan	KHAITAN / CROMPTON GREAVES / ALMONARD / ORIENT	
9)	MCB /MCCB / Fuse /Timer / RCBO	L&T / SIEMENS /ABB / GE POWER CONTROLS / SCHNEIDER /LEGRAND	
10)	Surge Protection Devices (SPDs)	OBO BETTERMANN / LEGRAND SCHNEIDER / SIEMENS /ABB / ERICO /DEHN	
11)	Cable Management System / Cable Tray	OBO BETTERMANN /LEGRAND /MK CENTAUR / EUBIQ / PANTY SYSTEMS	
12)	Lightning Protection Accessories	DEHN /ERICO / OBO BETTERMANN	
13)	Armoured LT power cable (PVC & XLPE)	POLYCAB / KEI / FINOLEX / GLOSTER / HAVELLS / RPG /CCI	

List of Approved Makes for Air Conditioning System

List of Approved Makes for High side Equipment

S.No	Equipment / Item	Approved Makes
1	Screw Chiller packages (Factory Packaged)	Trane/ Dunham Bush/ Carrier/ York/ Daikin McQuay/ Climaveneta/ Kirloskar / CIAT/ Voltas/ Bluestar/ Clivet/ Swegon Blue Box/ Hitachi
2	Reciprocating Chiller packages (Factory Packaged)	Voltas/ Bluestar
3	Scroll Chiller Packages (Factory Packaged)	Bluestar/ ETA/ Voltas/ Carrier/ Climaveneta/ Swegon Blue Box
4	Centrifugal Chiller packages (Factory Packaged)	Trane/ Dunham Bush/ Carrier/ York/ Daikin McQuay/ Climaveneta/ Kirloskar / Voltas/ Bluestar / Hitachi
5	<u>Compressors</u>	
a	Reciprocating	Voltas/ Accel/ Kirloskar/ Bock/ Bitzer
b	Screw / Centrifugal	Trane/ Dunham Bush/ Carrier/ York/ Daikin McQuay/ Mitsubishi/ Melco/ Bitzer/ Hanbell/ Hartford/ Kirloskar/ Hitachi
c	Scroll	Copeland / Emerson / Danfoss (Maneurop)/ Tecumseh
6	Pumps	Beacon Weir/ Kirloskar/ Crompton/ KSB/ Mather & Platt/ Grundfos/ Bell & Gossett/ Armstrong / Lubi
7	Cooling towers	Paharpur/ Mihir/ Advance/ Voltas/ Bell/ United Cooling Systems / Flow Tech Air Pvt Ltd
8	Open Expansion tank	Flosto
9	Closed Expansion tank	Xylem / KD Agencies / Anergy

II. List of Approved Makes for Low side Equipments & Clean room Accessories

S.No	Equipment / Item	Approved Makes
<u>a.</u>	<u>Cooling Equipment:</u>	
1	Double Skinned AHUs	Blue Star/Caryaire (flaktwoods) / ABB/Carrier/Boopathy/ Citizen/ ETA/ Zeco/Voltas/Edge Tech/VTs/ Systemair/ Crescendo India/ Finpower with Nicotra / Comefri / Kruger/ Greenheck/ flaktwoods fans
2	Fan coil Units	Voltas/Blue Star/Carrier/Citizen/ETA/ VTS/ Zeco/ Edgetech/ Systemair/ Crescendo India/ Finpower
3	Precision airconditioning Package units	Vertiv / Stulz / Blue star / Schneider / Climaveneta / Swegon Blue Box
4	Package Units	Voltas/ Blue Star/ Carrier/ ETA/ Trane
5	Ductable Split AC Units	Voltas/ Blue Star/ Carrier Midea/ ETA/ Daikin/ Trane/ Hitachi
6	Variable refrigerant Flow / Volume systems (VRF / VRV AC Units)	Voltas/ Blue star/ Carrier Midea/ O General/ Mitsubishi/ Dakin/ ETA Gree/ Toshiba/ Hitachi/ Trane
7	Split / Cassette / Floor standing AC Units	Voltas/ Blue Star/ Carrier Midea/ Daikin/ Hitachi/ Panasonic/ Mitsubishi / Toshiba/ Trane / O General/ Lloyd
8	Window AC Units	Voltas/ Carrier Midea/ Blue Star
9	Walk-in-coolers	Blue star/ Carrier/ Rinac/ Eakcon/ Voltas
10	Air cooling equipment (Evaporative coolers)	Roots/Humidin/Breezair/Bry air
<u>b.</u>	<u>Fans/ Blowers:</u>	
11	Centrifugal blowers	Nicotra/ Comefri/ Kruger/ Duvent/ ACCO/ NADI/ Greenheck/ flaktwoods/ Humidin
12	Axial flow fans	Systemair Kanalfakt/Nuaire/Kruger/Duvent/ ACCO/NADI/ flaktwoods/ Humidin
13	Inline/Propeller fans	Systemair Kanalfakt/Nuaire/Alstom

S.No	Equipment / Item	Approved Makes
14	Jet fans for Parking lots	Caryaire/Airovient/Systemair/Nuairegroup/Humidin
15	Heat recovery wheel	Arctic India/ Bry air
c.	<u>Ducting and allied accessories:</u>	
16	GSS ducting sheets	Sail/ Tisco/ Jindal/ Ispat
17	Aluminium Sheets	Nalco/ Jindal/ Indal/ Balco/ Hindalco
18	Factory fabricated GSS / Aluminium ducts	Rolastar/ Karthila/ Alpha duct (ETA)/ Zeco / Bhoopathy / GP Spira / Western air ducts
19	Factory fabricated GI and stainless steel Spiral / Circular ducts	GP Spira / Western air ducts
20	Fabric ducts	Durkeesox/ Sun green
21	Self adhesive sealing Gasket for ducts	Primakool
22	Anchor fasteners	Hilti / Fischer
23	Duct / Pipe supports	Gripple Hanger / Hilti
24	Grilles/Diffusers (Aluminium)	Airmaster/ Dynacraft/ Caryaire/ Air guide/ Ravistar / Tristar/ Ajanta/ Sachins impex/ Cosmic / Systemair/ Crescendo India
25	FA grilles	Caryaire/ Ravistar/ Airmaster/ Tristar/ Cosmic/ Systemair/ Crescendo India
26	Volume control dampers	Caryaire/ Ravistar/ Air Master/ Moosa Haji/ Tristar/ Cosmic/ Systemair/ Crescendo India
27	Duct Noise Attenuators	Intertec/Caryaire/Ravistar/Tristar/ Air master/ Cosmic/ Systemair
28	Fire dampers	Caryaire/ George Rao & Co./ Air master/ Ravistar/ Tristar/ Cosmic/ Systemair
29	Actuators for fire dampers	Joventa/ Belimo/ Anergy
d.	<u>Strip Heaters/ Pan Humidifiers</u>	
30	Strip Heaters	Daspass/ India heaters/ Spherhot

S.No	Equipment / Item	Approved Makes
31	Pan humidifier	Rapid Cool/ Klenzoids
32	Digital Temperature/RH measuring recording device.	Honeywell/ Johnson/ IRA
33	Modulating motors	Honeywell/ Belimo /Landis & Staefa (Siemens)
e.	<u>Clean Room Accessories</u>	
34	Five Micron/Superfine/HEPA Filters	Aerosol/ Klenzaid/ Purair/ M.N.Rama Rao & Co/ Chempharm Industries/ John Fowler (India) Ltd/ Trijama/ AAF/ Thermodyne/ Camfil
35	Fan filter units	SRP/ Fabtech/ CRP/ AAF/ Nicotra/ Camfil
36	Air Shower	Klenzaid/ Thermadyne/Envair/ Class/ Laminar/ CRP/ Alpha linear/ I-Clean/ Fab Tech/ Sri modular/ GMP Technical Solutions/ Microflow Devices India Pvt Ltd / Crescendo India
37	Modular clean rooms	Fabtech/ M+W zander/ Rinac/ SRP/ I Clean/ Sri Modular Clean rooms/ GMP Technical Solutions/ Microflow Devices India Pvt Ltd / Crescendo India
38	Pass boxes	Klenzaid/ Thermadyne/ Envair/ Class/ Laminar/ CRP/ Alpha linear/ I-Clean/ Fab Tech/ Microflow Devices India Pvt Ltd / Crescendo India

III. List of Approved Makes for Piping, Valves, Controls, Insulation and Vibration Isolators

S.No	Equipment / Item	Approved Makes
a.	<u>Piping:</u>	
1	MS / GI Pipes	Jindal/ Prakash/ Tata
2	Pre insulated chilled water pipes	Seven star/ Zeco/ Perma pipe
3	Flexible pipe connection	Resistoflex/ Flexionics / Corirubber
4	Victaulic Joints for pipes	Victaulic/ Sevcon
b.	<u>Valves:</u>	
5	Gate/Globe/Reflux Valves	Advance/ Leader/ Trishul/ Divine/ Kirloskar/ C & R/ Lehry
6	Butterfly Valves	Audco/ Advance/ Saunders/ C & R/ Lehry
7	Actuators for Butterfly valve	Rapid control
8	Balancing Valves(Manual)	Advance/ TA Digital/ Lehry
9	Balancing Valves(Automatic)	Flowcon/ TA-Auto flow
10	Ball valves	Audco/ Rapid control/ Emerald/ Honeywell/ Lehry
11	Safety thermostat	Anergy Controls
12	3 - Way valves(Mixing)	Johnson control/Honeywell/ Sauter/Landis & Staefa (Siemens)/ Lehry
13	Pot strainer/Y strainer	Emerald/ sant/Leader/Honeywell
14	seperator/relief valves	AC accessories / Anergy Instruments
15	Auto air vent	Anergy Instruments/Rapid control
16	Pre insulated valves	Advance / Valtree
c	<u>Control/Instruments:</u>	
17	Thermostat	Johnson control/Honeywell/Ranco/Landis & Staefa (Siemens)
18	Humidistats	Johnson control/Honeywell/Penn/ Landis & Staefa (Siemens)
19	AFT	Johnson control/Honeywell/Penn/Landis & Staefa (Siemens)

S.No	Equipment / Item	Approved Makes
20	Thermometers	H.Guru/Fiebig/Taylor/Penn / Waree
21	Water Pressure Gauge	H.Guru/Wika/Dwyer / Waree
22	Refrigerant Gauge	Marsh/Wika/ Fiebig
23	Flow Switches	Danfoss/Rapid control
24	Expansion valves	Alco/Sporlan / Danfoss
25	Solenoid valves	Alco/Sporlan/Anergy/Danfoss
26	HP/LP switches	Danfoss/Ranco/Johnson
27	Oil safety switches	Ranco/Penn
28	Airstat	Rapid control
29	Safety thermostat	Anergy Controls
30	Refrigerant globe valve	Audco/Kim
<u>d</u>	<u>Insulation:</u>	
31	Glass wool	FGP / UP Twiga / Kimmco / Owens corning
32	Mineral wool	Lloyd Insulation
33	Rock wool	Thermek / Lloyd Insulation
34	Expanded Polystyrene	Beardsell / Lloyd Insulation
35	Extruded polysterene	Owens Corning
36	PUF	Lloyd Insulation / Beardsell / Bakelite Hylam / VND Cell Plast
37	Rigid Phenolic foam	Bakelite Hylam / VND Cell Plast
38	Expanded Polyethylene	Profeel Sentinel
39	Cross linked polyethylene	Trocellen / Supreme / Aerolam
40	Cross linked polyolefin foam	Thermobreak / Supreme / Aerofoam
41	Hessian	Navair / Pyroguard
42	Nitrile rubber	Armaflex / Aeroflex / Vidoflex / K Flex
43	Adhesive for insulation	Birla 3M FB 42 NF plus NV/MAS-17 / Pidilite

S.No	Equipment / Item	Approved Makes
44	Fire sealants	Birla 3M / Hilti
<u>e</u>	<u>Vibration Isolators:</u>	
45	Spring Type	Resistoflex
46	Cushy Foot	Dunlop/ Resistoflex/ Flexionics

IV. List of Approved Makes for BMS / DDC

S.No	Equipment / Item	Approved Makes
1	BAS system/DDC Controller/ System integration units	Johnson/Honeywell/Race/Siemens/Trane/Sauter
2	Temperature sensor (Immersion/Duct/Outside	Johnson/Honeywell/Siemens/Trane/Sauter/ Invensys/Ranco
3	Humidity sensor (Duct/Room)	Johnson/Honeywell/Siemens/Trane/Sauter/ Invensys/Penn
4	Pressure transmitter	Johnson/Honeywell/Siemens/Invensys/Sauter/
5	Flow meter	Invensys/Forbes Marshal/J N Marshal
6	Differential pressure switch	Johnson/Honeywell/Siemens/Invensys/Sauter/ Trane
7	Water flow switch	Johnson/Honeywell/Siemens/Invensys/Danfoss/ Trane/Beck Gmbh
8	Level switch	Johnson/Honeywell/Siemens
9	Level Transmitters	Johnson/Honeywell/Siemens/Invensys/Sauter
10	2/3 way motorised control valve, Motorised butterfly valve	Johnson/Honeywell/Siemens/Trane/Sauter/ Belimo
11	Modulating motors	Honeywell/Siemens/Belimo
12	Electric actuators for 2 way ON/OFF valves	Johnson/Siemens/Sauter/Beacon-Rotork/ Belimo
13	Control/communication/signal Cable	Beldon/Fusion Polymers/R R Cables/Finolex/ Geoflex
14	Computer and accessories	HP/ Dell/ HCL
15	Printer	HP/ Cannon/ Epson

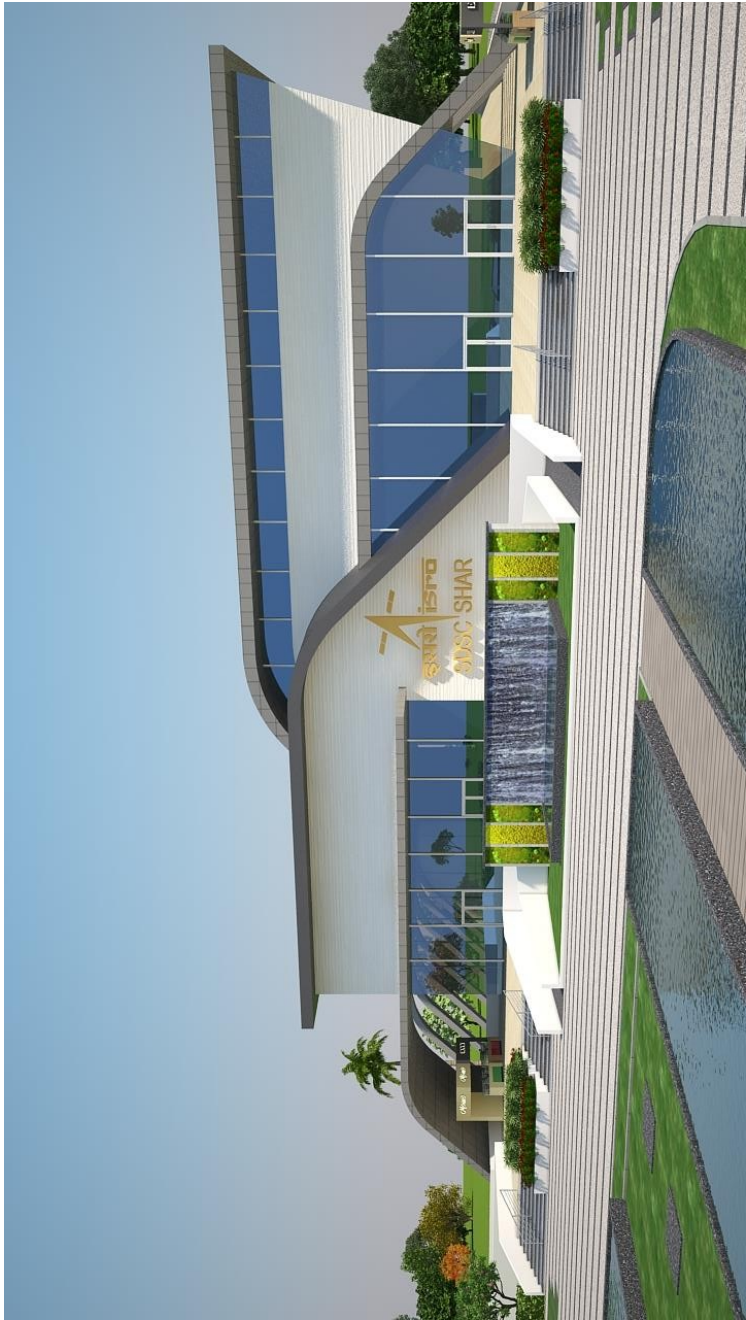
V. List of Approved Makes for Electrical Items

S.No	Equipment/ Item	Approved Makes
1	Electric motors	ABB/Siemens/Crompton Greaves/Kirloskar/NGEF/Jyothi/Bharat Bijlee/GE/ABB (IS marked)/Laxmi Hydraulics Pvt. Ltd
2	Starters	Siemens/L & T/Schneider/GE power controls/Tecnic/ABB/Crompton
3	Soft starter	Allen Bradley/Crompton
4	Variable speed drives	Emerson (Control Techniques)/ABB/Nelco/ Landis & Staefa(Siemens)/Hitachi/Danfoss/Siemens/ Yaskawa
5	Miniature circuit breakers (MCBs)	MDS legrand/ Havells/ Versatrip/ GE power controls/ Siemens/ Indo Kopp/Safeline/ Indo-Asian/ S& S/ Datar/H.H.Elcon./ Schneider/ Hager(L & T)/ Alstom/ ABB/North-West/AREVA T&D/Standard
6	Earth Leakage Circuit breakers	GEC-Alsthom/ MDS Legrand/ GUTS/ Prok-DVS/ Siemens/Havells/ GE power controls/Indo-Kopp/ Datar/ H.H.Elcon./ Schneider/ABB/North-West
7	Moulded case circuit breakers	L&T/Siemens/English Electric/ Alsthom/ HH Elecon/ GE Power controls/ ABB/ MDS Legrand/ Schneider/ C &S/Standard/Havells
8	Air circuit breakers	L&T/ Siemens/ NGEF/ Alsthom/GE power controls/Jyothi/ABB/ C&S/ Schneider Electric/ MDS Legrand/English Electric
9	Overload relays with built-in single phase preventor	L&T/ Siemens/ GE power controls/ABB/Schneider Electric
10	HRC fuse base and carriers	L&T/ GEC-Alsthom/ Havells/ Siemens/ Standard/Indo-Kopp/ GE Power Controls
11	MV Switch fuse units and Isolators up to 250A	L&T/ Alsthom/ Siemens/ Standard/English Electric/C&S/ Havells/ Versatrip/HH Elecon/Schneider/ Indo-Asian/ GE Power Controls
12	MV Switch fuse units and Isolators above 250A	L&T/ Alsthom/ Siemens/ Schneider/ GE Power Controls/English Electric/ ABB.
13	HRC fuses	L&T/ Alsthom/ Havells/ Siemens/GE Power/Controls/Bharth/ Linder/ S&S/ Indo-Kopp/ HH/Elcon/ C&S/ Versatrip/ Crompton Greaves/Standard.

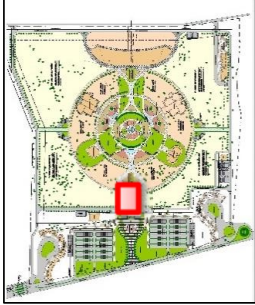
S.No	Equipment/ Item	Approved Makes
14	Current/Voltage Transformers	Kappa Electricals/ AE/ NIPPEN/Neutronics/ C & S/ INTRANS/Gilbert & Maxwell
15	Metallic Conduit (ISI marked)	BEC/AKG/Vimco
17	Cable Tray (Factory fabricated)	Slottco/Profab Engineer/Hi-reach/M M Enterprises
18	Armoured power cable	Fort Gloster/ Indian Aluminium Cable/ INCAB/Universal/ICC/Finolex/ CCI/RPG/Torrent/ Nicco/ Havells/ KEI Industries
19	Capacitors	Unistar/ Mehar/ Asian/ Sprague/ Crompton Greaves/Siemens/Khatau Junker/ L&T/ GE Power controls
20	Automatic power factor correction relay	Bleuk(Germany)/Enercon system Pvt. Ltd/ L&T/Alstom/Areva T&D/Conzerv
21	<u>Analog instruments:</u> Ammeter, Voltmeter, Frequency meter, PF meter	AE/IMP/Nippen/ MECO/ Havells/ Neutronics/L&T (Rishab)/ Riken.
22	<u>Digital type instruments:</u> Ammeter, Voltmeter, Frequency meter, PF meter, KWH meter	Clectro systems/ AE/ L&T/ Enercon/GE Digital/CG Schlumberger
23	Single and three phase Energy meters	Remco (BHEL)/ Havells/ Siemens/ MET/ Alind/ Jyothi/ ECE/ UE/ Capital/ L & T/Enercon.
24	Air Break power/Control Contactors	L&T/ Siemens/ GE/ Bhartia/ Cutler-Hammer/ Crompton Greaves/ ABB/ Telemechanic
25	Push button ,indication lamps	Siemens/Tecnic/ Vaishnav/ Bhartia /Cutler-Hammer/L&T/Crompton Greaves/ ABB/GE Power controls /Schneider
26	Protective Relays(EM & Numeric)	ASEA/ ALIND/ Asea Brown Boveri/ Easun/Siemens/ Alstom/ English Electric /GE/ Jyoti/ L & T.
27	Rotary switch	L & T/ GE Power controls/Siemens
28	Time delay relay	L & T/ GE Power controls/Siemens/Bhartia Cutler Hammer
29	Timer	L & T/ GE Power controls/Siemens/Schneider Electric

S.No	Equipment/ Item	Approved Makes
30	Selector switch, Toggle switch	L & T/Kaycee
31	Change over switch	L & T/ H H Elcon/Siemens/Standard/HPL/C&S/Havels/Indo-Asian//Versaatrip/Schneider/GE power controls

01 – ENTRANCE PLAZA – FRONT VIEW



ISRO-VISITOR COMPLEX-SDSC SHAR



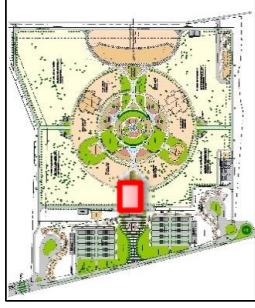
KEY PLAN



02 – ENTRANCE PLAZA – FRONT & SIDE VIEW (AERIAL)



ISRO-VISITOR COMPLEX-SDSC SHAR



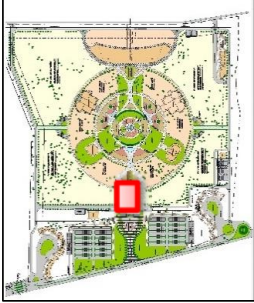
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03 – ENTRANCE PLAZA – FRONT & SIDE VIEW (AERIAL)



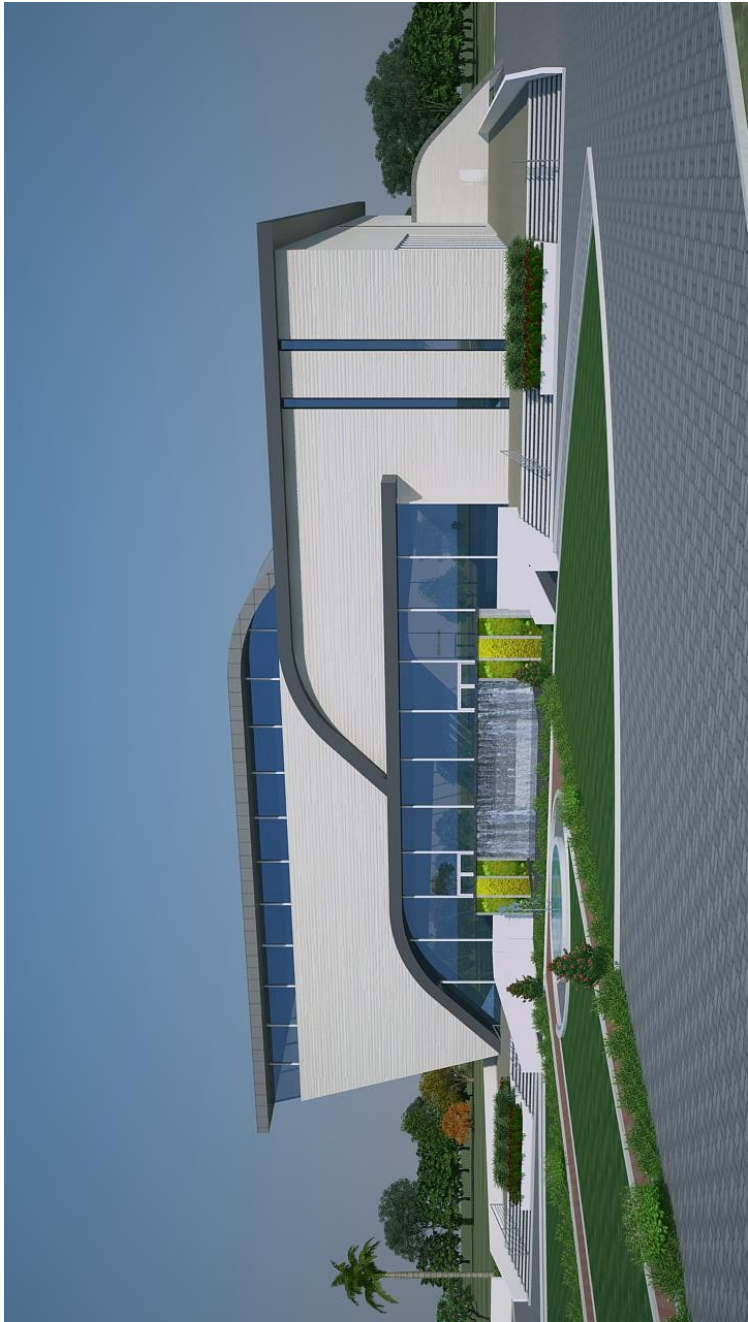
ISRO-VISITOR COMPLEX-SDSC SHAR



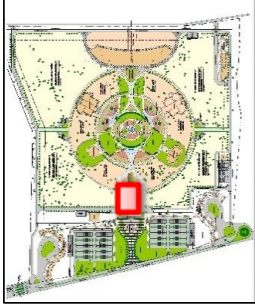
KEY PLAN



04 – ENTRANCE PLAZA – REAR SIDE VIEW

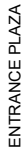


ISRO-VISITOR COMPLEX-SDSC SHAR



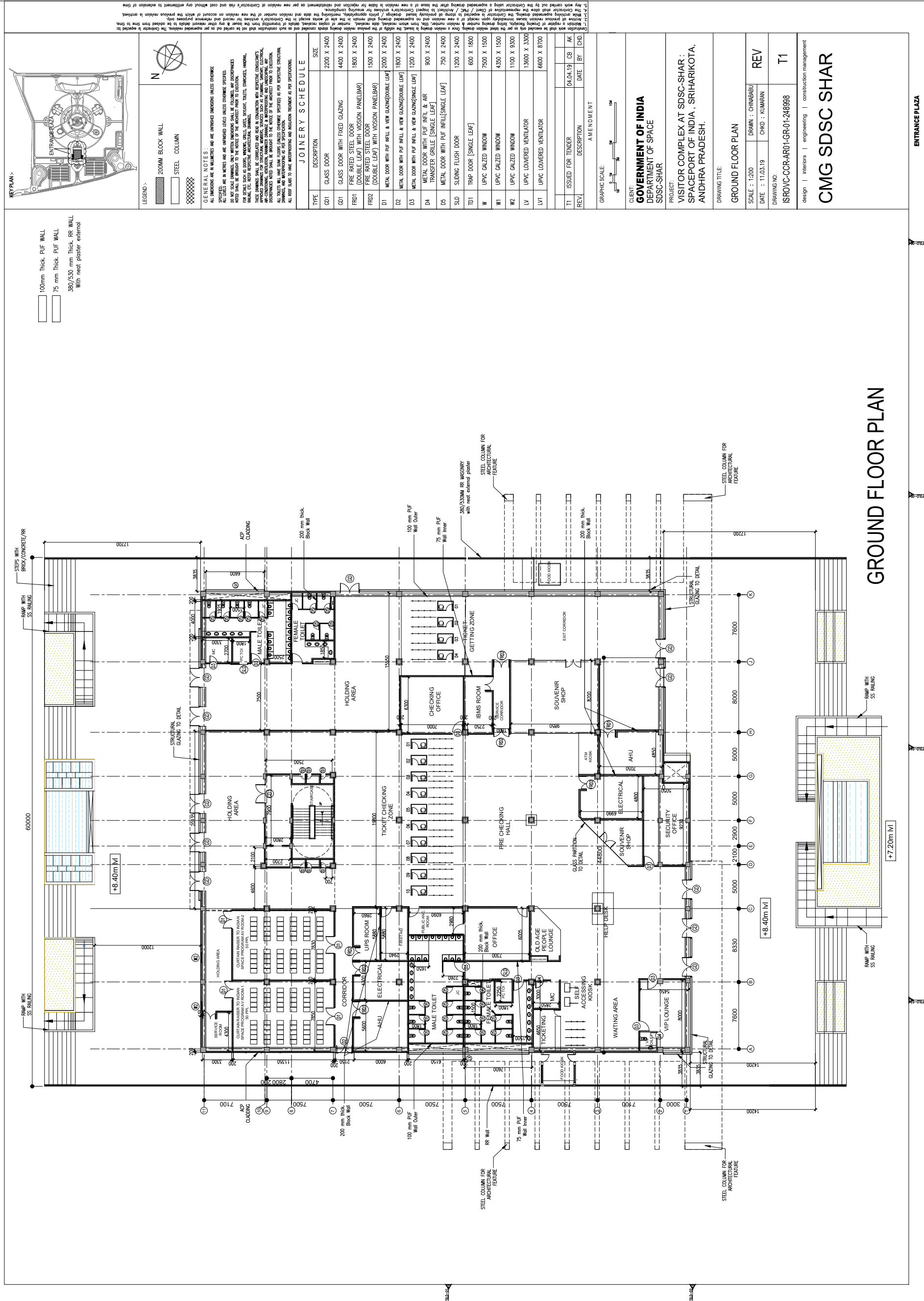
KEY PLAN













Satish Dhawan Space Center SHAR

Welcome, Materials Master (isro)

31 August 2017,
17:16:08 IST

[MAIN VIEW](#)

[HELP](#)

Preview For STANDARD TERMS AND CONDITIONS

Page Destination: Tender Header **Format Type :** Normal

. :

GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

SATISH DHAWAN SPACE CENTRE

PURCHASE DIVISION

Tele No.08623-225023/225174/225127

Fax No.08623-225170/22-5028

e-Mail ID : hps@shar.gov.in, hasan@shar.gov.in, sselvan@shar.gov.in

STANDARD TERMS & CONDITIONS

1.OFFERS SHALL BE SENT ONLINE ONLY USING STANDARD DIGITAL SIGNATURE CERTIFICATE OF CLASS III WITH ENCRYPTION / DECRYPTION. THE TENDERS AUTHORISED ONLINE ON OR BEFORE THE OPEN AUTHORISATION DATE AND TIME ONLY WILL BE CONSIDERED AS VALID TENDERS EVEN THOUGH THE BIDS ARE SUBMITTED ONLINE.

2.THE TENDERER MUST AUTHORISE BID OPENING WITHIN THE TIME STIPULATED IN THE SCHEDULE BY SDSC SHAR. OTHERWISE THE ONLINE BID SUBMITTED WILL NOT BE CONSIDERED FOR EVALUATION. PHYSICAL COPY WILL NOT BE CONSIDERED EVEN THOUGH IT IS RECEIVED BEFORE THE BID SUBMISSION DATE.

In case of two-part tenders, parties shall submit their offers as follows:-

1) Part-I – Techno-commercial Bid

(No price details shall be mentioned in this bid and shall not upload the details of price along with the techno-commercial bid)

2) Part-II – Price Bid

In view of Two Part Tender, the Offers submitted contrary to above instructions will be summarily rejected.

3.In case, the tenderer is not interested to participate in the tender, the tenderer shall submit regret letter giving reasons, failing which future enquiries will not be sent.

4.**Offer Validity:** The validity of the offers / tenders should be 90 days (in case of single part tender) and 120 days (in case two part tender) from the date of opening of the tenders. Tenders with offer validity less than the period mentioned above, will not be considered for evaluation.

5.**GST** - GST and/or other duties/levies legally leviable and intended to be claimed should be distinctly shown separately in the tender. GST details are given below

GSTIN: 37AAAGS1366J1Z1

LEGAL NAME : SATISH DHAWAN SPACE CENTRE SHAR

VALIDITY FROM:29/08/2017

TYPE OF REGISTRATION:REGULAR

6.**Customs Duty** - SDSC-SHAR is eligible for 100% Customs Duty exemption as per Notification No. 050/2017 539 (b) Dt: 30.06.2017. This may be taken into account while quoting for import items, if any.

In case tenderers offering items considering customs duty exemption, they should also indicate the bill of materials and price, separately, with Customs Duty component and terms and conditions thereto.

8.**Advance Payment** - Wherever advance payment is requested, Bank Guarantee from any Nationalized Bank/Scheduled Bank should be furnished. In case of advance payments, if the party is not supplying the material within the delivery schedule, interest will be levied as per the Prime Lending Rate of RBI plus 2% penal interest.

Interest will be loaded for advance payments/stage payments as per the prime lending rate of RBI and will be added to the landed cost for comparison purpose. In case of different milestone payments submitted by the parties, a standard and transparent methodology like NPV will be adopted for evaluating the offers.

9.**Liquidated Damages** - In all cases, delivery schedule indicated in the Purchase Order/Contract is the essence of the contract and if the party fails to deliver the material within the delivery schedule, Liquidated Damages will be levied @ 0.5% per week or part thereof subject to a maximum of 10% of total order value.

10.**Performance Bank Guarantee** - Performance Bank Guarantee for 10% of the order value should be furnished in the form of Bank Guarantee from nationalized/scheduled bank or by Demand Draft valid till warranty period plus sixty days as claim period.

11. **Security Deposit** – Security Deposit for 10% of the order value is mandatory, if the ordered value is Rs.5.00 lakhs and above. Party shall furnish the Security Deposit in the form of Bank Guarantee from nationalized/scheduled bank or by Demand Draft valid till completion of the contract period plus sixty days towards claim period for faithful execution of the contract.

12. **BANK GUARANTEE FOR FIM:** Supplier has to submit Bank guarantee for equal value of Free Issue of Materials (FIM) issued by the Department from Nationalised / Scheduled Bank valid till receipt and acceptance of supply and satisfactory accounting of FIM plus sixty days as claim period.

13. The delivery period mentioned in the tender enquiry, IF ANY, is with the stipulation that no credit will be given for earlier deliveries and offers with delivery beyond the period will be treated as unresponsive.

14. The Department will have the option to consider more than one source of supply and final orders will be given accordingly.

15. The bidders should note that conditional discounts would not have edge in the evaluation process of tenders.

16. Non-acceptance of any conditions wherever called for related to Guarantee/ Warranty, Performance Bank Guarantee, Security Deposit, Liquidated damages are liable for disqualification.

17. Wherever installation/ commissioning involved, the guarantee/warranty period shall reckon only from the date of installation and commissioning.

18. Purchase/Price Preference will be extended to the MSMEs under the Public Procurement Policy for MSMEs formulated under the Micro, Small and Medium Enterprises Development Act, 2006 and instructions issued by Government of India from time to time. Vendors who would like to avail the benefit of MSME should clearly mention the same and submit all the documentary evidences to substantiate their claim along with tender itself.

19. The drawings, specifications, end use etc., given by the Centre/Unit along with the tender enquiry are confidential and shall not be disclosed to any third party.

20. **SPECIAL CONDITIONS FOR SUBMITTING QUOTATIONS IN FOREIGN CURRENCY BY THE INDIAN AGENTS**

The Tenderer should submit the following documents/information while quoting:-

a) Foreign Principal's proforma invoice/quote indicating the commission payable to the Indian Agent and nature of after sales service to be rendered by the Indian Agent.

b) Copy of Agency agreement with the Foreign Principal and the Indian Agent, precise relationship between them and their mutual interest in the business.

c) Registration and item empanelment of the Indian Agent.

d) Agency Commission will be paid only Indian Currency.

e) Compliance of the tax laws by the Indian Agent.

21. **High Sea Sales-** Against High Sea Sale transactions:

a. Offers shall be on all inclusive basis including delivery upto Sriharikota at the risk and cost of the supplier. Customs Clearance is the responsibility of the supplier and at his cost and risk.

b. 100% payment will be made within 30 days after receipt and acceptance of the items at our site.

c. GST as applicable

d. Customs Duty Exemption Certificate and other relevant documents required for Customs clearance will be provided.

e. High Sea Sales Agreement furnished by the supplier in accordance with the terms and conditions of our purchase order will be signed and issued by SDSC-SHAR.

22. The following information/ documents are to be submitted wherever applicable.

1. Product Literature

2. Core banking account number of SBI, RTGS Details

3. PAN No. in quotation and invoices

4. GST Registration details.

5. In case of MSME, registration details / documents from Competent Authority.

23. **EXCLUSION OF TENDERS**

The following tenders shall be summarily rejected from the procurement process

a. Tenders received from vendors who have not qualified in terms of their registration.

b. Tenders received against publishing of a limited tender in the CPP portal.

c. Tenders of vendors who have been removed from the vendor list or banned/debarred from having business dealings.

d. Unsolicited tenders from vendors.

e. The tenders which materially depart from the requirements specified in the tender document or which contain false information.

f. The tenders which are not accompanied by the prescribed Earnest Money Deposit.

g. The tenders of vendors who have not agreed to furnish Security Deposit, Performance Bank Guarantee and Liquidated Damages.

h. The validity of the tenders is shorter than the period specified in the tender enquiry.

i. The tenders received from vendors or their agents or anyone acting on their behalf, who have promised or given to any official of the Centre/Unit/Department, a gratification in any form, or anything of value, so as to unduly influence the procurement process.

j. The tenders received from vendors, who, in the opinion of the Centre/Unit, have a conflict of interest materially affecting fair competition.

k.The tenders received from Indian agents on behalf of their foreign Principals/OEMs (in cases where the Principals/OEMs also submit their tenders simultaneously for the same item/product in the same tender).

l.In case two or more tenders are received from an Indian agent on behalf of more than one foreign Principal/OEM, in the same tender for the same item/product.

m.If a firm quotes 'NIL' charges / consideration, the bid shall be treated as un-responsive and will not be considered.